the OIL AND GAS JOURNAL

NOVEMBER 25, 1957

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- **AAODC DRILLING REPORT**
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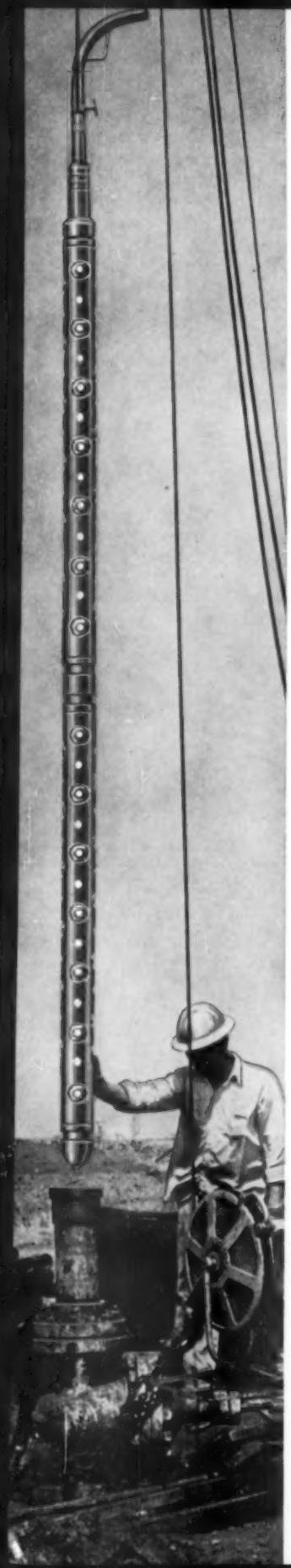
- **Automatic Shutdown and Alarm System for Gasoline Plant** p. 102



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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Nov. 25, 1957

The boom outlook persists for petrochemicals:

Chemical research and development leaders meeting in Houston last week say production will double to 85 billion pounds by 1965. Petrochemical share of total chemical output will increase from 26 to 40 per cent (p. 59).

The effect on oil will be considerable. Petrochemicals will require nearly 99 million barrels of crude yearly. This will be 2.3 per cent of crude runs to stills compared with 1.45 per cent now.

Most of the new capacity will be installed along the Gulf Coast where 80 per cent of present capacity is located.

One expected trend: Petrochemical manufacturers face increasing competition from refiners for their raw materials. Complex requirements for new high-octane motor fuels will force refiners to use more of the petrochemical building blocks in their own plants instead of selling it.

Proration is going on the double-standard in New Mexico.

Allowables for fields served by new Four Corners pipeline will be different than those for rest of state, currently set at 37 bbl. daily per well.

Explanation: Crude from two regions have separate markets. Four Corners line will move crude to West Coast refiners. Other state crude moves east. Thus the two don't compete and allowables will be based on different set of market demands.

Supply of line pipe has changed sharply in recent months.

A 2-year-wait for delivery on sizable orders for big-inch pipe is no longer the rule. In fact, some companies have been able to fill orders on a few months' notice.

The result is that pipeline companies no longer hurry to place orders far ahead of actual need as they were doing.

Vast new areas in Alaska will be open to leasing.

Interior Department next month will lift its 14-year freeze on a 20-million acre section surrounding the naval oil reserve on three sides. All of the land lies 100 miles or more above the Arctic Circle (p. 62).

First land open will be 16,000 acres in Gubik gas field.

Tip for countering Russian technology: Scout their scientific literature.

American scientists returning from a tour of the Soviet warn not to underrate general level of Russian technology in nearly all fields, including basic research.

Russians read everything they can get their hands on coming from the U. S. Say the Americans: "We've got to start studying their literature. It's like football. The other team may not be red hot, but you've always got to scout their plays."

Keep an eye on possible move in Congress to draw up standby price, wage, and material controls.

Oil has a big stake in such a move.

Sen. Homer E. Capehart of Indiana is advocating the action, indicating he will bring it up when Congress studies Defense Production Act, now due to expire June 30. He says a plan for emergency economic action is a must because of the perilous world situation.

Oil has at least two major interests in such a plan: Be sure it isn't caught with its prices down and be sure it gets a fair allocation of steel. Key to industry's role in any emergency will be steel.

Merry free-for-all fight over oil and gas leases on federal wildlife lands may come December 9.

That's date of Interior Department's public hearing on its new regulations. New rules ban all leasing in refuges except where necessary to protect against drainage. Limited leasing will be allowed on game ranges, Alaskan wildlife areas, and federal-state cooperative areas.

Department ran into trouble last year with conservation bodies when it opened the refuges. Its rewritten rules now are being opposed by oil men looking for new fields to explore.

Noticed the new styling in trucks these days?

You can expect even more sweeping engineering changes in next few years. General Motors, for one, has expanded its truck-engineering department and is working on new concepts for trucks that have major economic significance.

These will be trends: New engines with higher performance, longer life, more economy. Improvement in gasoline or diesel-fuel mileage by 1 mile per gallon alone would save the nation's truckers $800 million yearly.

Other changes which would mean more profits to truckers include less weight, more cargo space, better brakes, new types of power transmission, more comfort and safety for drivers.

Exploration men are finding oil and gas in old familiar places (p. 156-158).

It underscores importance of taking a second look at our old oil fields.

Geologists say this type of search is natural for the independent. Mountains of subsurface data are available for the having. There should be good hunting in extensions of older pools, flank exploration on salt domes, new interpretation of effects of faulting or in just deeper drilling.

October proved a fairly brisk drilling month. Significant discoveries turned up (p. 148):

...Williston is still hot with new Lignite-Mississippian field in active Burke County. Rapid development is continuing.

...Northwestern Oklahoma held its rank as a top wildcat area of Mid-Continent. Shell added second well to new field in Ellis County. Sinclair opened fifth producing area in Woodward County. Pan American opened Cottage Grove-Pennsylvanian gas production in Major County.

...Appalachian region is attracting new interest. Big drilling play in Wayne County, Ohio, may turn up the richest gas pool found in state in 25 years.

...Offshore Louisiana has two interesting hits. Shell's new gas find in Block 139, Ship Shoal area, is state's 18th offshore field found this year. Tidewater may have important discovery in Cyprian Bay area.

...New Mexico still provides good hunting. Continental 10 Navajo-A gasser may prove important link between Desert Creek and White Mesa fields. State's deep wildcat activity in Permian basin, meanwhile, is moving south again with several wildcats working.

Total domestic demand shows signs of picking up.

For last 3 months demand averaged 8,400,000 bbl. daily, up only one-half of one per cent from year ago, according to IPAA reports.

For next 3 months, IPAA estimates demand at 10,225,000 bbl. daily, a gain of 4.1 per cent over same time a year ago. This will mean market for 7,150,000 bbl. daily of domestic crude, a gain of 350,000 bbl. daily over November.

Canada is having its oil troubles.

Trans-Mountain pipeline will cut its tariff by 5 cents a barrel effective January 1. It's a move to improve competitive place of Canadian crude in West Coast markets. Lower tanker rates have made foreign oil very attractive to coastal refiners.

But Alberta producers still face a cutback next month. A 10 per cent cut in nominations is coming in December. The figure is due to drop from 290,000 bbl. daily to 260,000 bbl.

Industry leaders see long-term comeback. R. A. Brown, president of Home Oil, told Montreal investment analysts crude sales will move up to 400,000 bbl. daily early in 1958 and should exceed 600,000 bbl. daily within a short time. He

sees potential larger markets in Puget Sound and Montreal areas. Brown even suggests immediate construction of another crude pipeline from the west to serve Montreal market.

Management notes: Look for aluminum drums to follow recent appearance of motor-oil cans made of the light metal. Higher initial costs will be offset by savings in freight and handling, especially since cans can be salvaged.

Automation fears of union leaders or confused employes may be allayed with this note from Dr. Alan T. Waterman, director of National Science Foundation: If automation hadn't been applied to our telephone system, it would take every woman in U. S. between 20 and 40 to operate the switchboards.

Off-season vacations are becoming more and more popular for workers getting 3 and 4 weeks off during year. National Industrial Conference Board reports: Management is finding that split vacations or extending vacation season to include whole year is easing problems of work interference.

Filtered water for testing new pipelines hydraulically is now being used.

Filters were used in preparing water for testing 700 miles of 30-in. line laid this year for Texas Eastern. Object was to remove silt and suspended matter from river water pumped into the test sections.

Otherwise pressure applied during tests knocked tremendous quantity of silt out of suspension. This makes pigging the line afterward a king-size job.

Offshore Texas area has first gas-gathering system.

Standard of Texas is selling gas from 15 wells in Chevron field off Padre Island. A 6-in., 3½-mile gathering system connects five production platforms in field. Gas then moves 1½ miles from a central platform through 10-in. line to onshore connection with Texas Eastern's system.

New method of chemically cleaning a crude-oil pipeline has been used on Gulf's West Texas to Port Arthur line (p. 82).

Deposits removed quickly and economically were oils, greases, iron sulfides, and iron oxide. Plan calls for pumping these chemical agents through line: A degreaser of alkaline solution containing a detergent, then a water flush, a descaler of inhibited hydrochloric acid with a wetting agent, then water flush, descaler again, and water flush, and finally a neutralizing solution.

Italian shipyards are talking of building propane tankers as large as 47,000 tons to move LPG from Middle East to Europe for industrial fuel. Western Germany is being studied as probably the best market.

Good Wells Make Good News

November 25, 1957

CEALMENT*—A Dowell-originated cementing service that employs latex-cement—is helping operators solve such varied problems as water encroachment, communication between zones, and lost circulation. Some recent jobs using Cealment are reported here.

- **Saint Martin Parish, South Louisiana** (Drilling Well): Operator set 9⅝-inch casing at 9404 feet. Circulation was lost while drilling to 9874 feet. When common lost circulation materials failed, well was squeezed 12 times with neat portland cement. Even though two of these jobs were 1000 sacks each, circulation was not regained. Cealment, using 60 barrels of latex-cement, was tried. Slurry was squeezed into formation at 2100 psi. After drilling out plug, *operator continued drilling using 17.7 pound mud and got full returns.*

- **Garvin County, Oklahoma** (New Well): While 5½-inch production string was being set, it parted at 1530 feet and shifted so bit could not be run. Operator ran tool to align casing, and then set packer just above break. After three unsuccessful neat portland cement squeeze jobs, *Cealment was used. First latex-cement squeeze was successful. Operator drilled out and completed well. Latex-cement still holding after more than one year.*

- **Greenwood County, Kansas** (Old Oil Well): Drilled in 1925 and completed open hole, 2323 to 2377 feet, by setting casing on shoulder without cementing. Production had declined to 2 bopd with high volume of water. Operator wanted to fracture but feared old depleted gas zone up behind casing would take the fluid. Cealment was used to set liner 2274 to 2340 feet to shut off gas zone and permit fracturing of the pay. *After fracture treatment by Dowell, well is now producing 15 to 20 bopd with little water.*

- **Midland County, West Texas** (Old Oil Well): Originally completed in Spraberry, plugged back to Clearfork and perforated 6393 to 6415 feet. Well swabbed only mud and water, indicating channels in original cement job. Cealment was ordered. Retainer was set at 6343 feet, and 500 gallons latex-cement was pumped in place. *After being drilled out and re-perforated, well made allowable.*

Good bonding, resistance to contamination, and excellent perforating characteristics are three important qualities of Dowell's latex-cement. To get full advantage of these qualities, rely on Dowell's 2½ years experience with latex-cement—specify Cealment!

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The Oil and Gas Journal, published Mondays, copyright 1957, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

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TECHNOLOGY—OPERATION

AAODC Drilling Report

How Rotary Speed Affects Penetration Rate **86**

By J. E. Eckel and D. S. Rowley

Penetration rate in drilling increases with rotary speed but not in proportion. The penetration rate curve tends to flatten out at higher speeds, and is more pronounced with carbide-studded bits than with milled toothed bits.

How Weight Affects Penetration Rate **88**

By H. B. Woods and E. M. Galle

Over-all averages of the effect of weight in a number of drilling tests show an approximate straight-line relationship between weight and drilling rate. Within the range of weight investigated, a 50 per cent increase in weight gave a 65 per cent increase in drilling rate.

Weight-Rate Curve Over Short Interval **91**

By Arthur Lubinski

Here is a method which should permit determination of an entire rate-versus-weight curve over a very short interval, generally of a few inches.

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By M. M. Brantly

Six study groups are investigating equipment requirements, practices and procedures, water locations, water shutoff, and aerated muds.

Drilling Contractors Can Help Lower Equipment Costs **95**

By Rainey Elliott

With the cooperation of the drilling contractors, supply companies can reverse the trend of expensive and sometimes foolish practices of services that exist.

Drilling-Production

Free Piston Has Quick Payout **110**

By Norman F. Brown

The use of a free piston in gas lifting has increased gas production up to 35 per cent and liquid production up to 23 per cent. Payout has averaged about 4 months.

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Pipelining

Old Crude Lines Get a Cleaning For Field-Products Service **82**

By J. F. Stephenson, H. E. Waldrip and H. B. Green

A new method of chemically cleaning the interior of crude-oil pipelines now offers important savings in time and money to pipeline operators.

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Refining-Processing

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By D. H. Stormont

Premium Motor Fuel From Gilsonite **98**

By D. H. Stormont

At its new refinery near Grand Junction, Colo., American Gilsonite Co. is producing about 1,300 bbl. daily of high-quality gasoline from an asphaltite which is solid at normal temperatures.

Spivey Gasoline Plant Features Automatic Shutdown and Alarm System **102**

By John C. Reidel

This Attica, Kans., plant has 58 owners and processes 30,000,000 cu. ft. per day of gas with Magnolia Petroleum Co. as operator.

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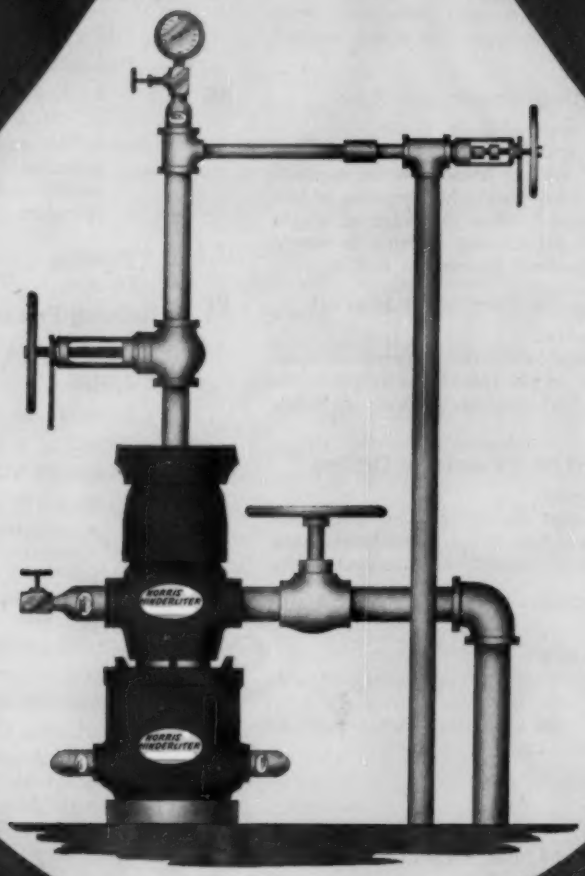

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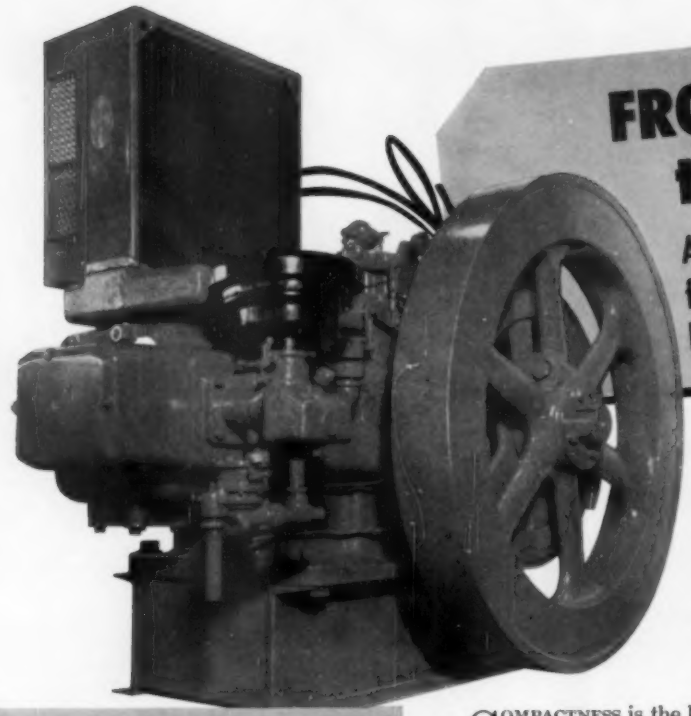

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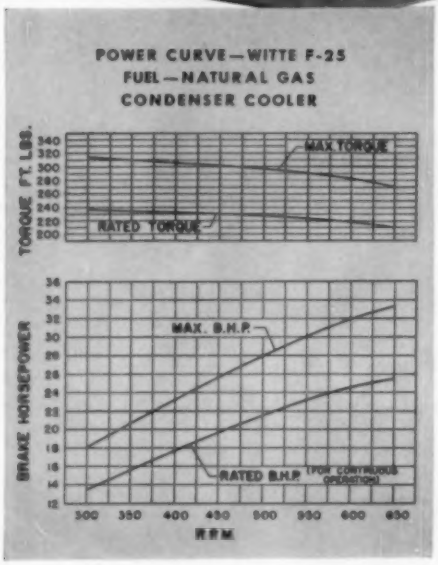

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Continuous Horsepower Range	hp	15.7 to 25
Continuous Speed Range	rpm	350 to 625
Flywheel Effect at Rated Speed WR^2		1732 lb ft^2
Oil Capacity	quarts	16
Water Capacity	gallons	7
Length, Overall	inches	62¼
Height, Overall	inches	50⅝
Width, Overall	inches	52-11/16
Weight	pounds	3,200

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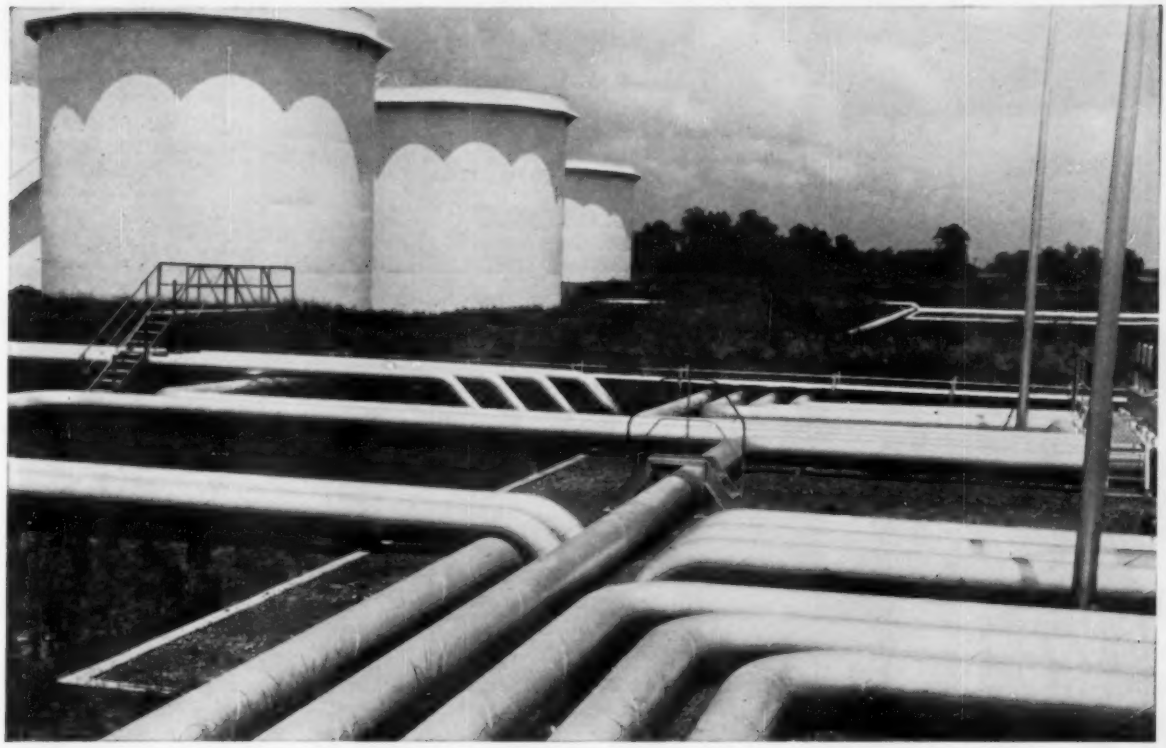

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   b. Natural gasoline plant piping
   c. Residue gas lines
   d. Gas transmission lines
2. **Oil Refining Division**
   a. Stock lines
   b. Low pressure steam lines
   c. Vapor collection lines
   d. Waste product lines
3. **Oil Producing Division**
   a. Casing
   b. Oil lines
4. **Miscellaneous uses (all divisions)**
   a. Conduit or casing pipe
   b. Pipe piles, pile shells
   c. Water well casing
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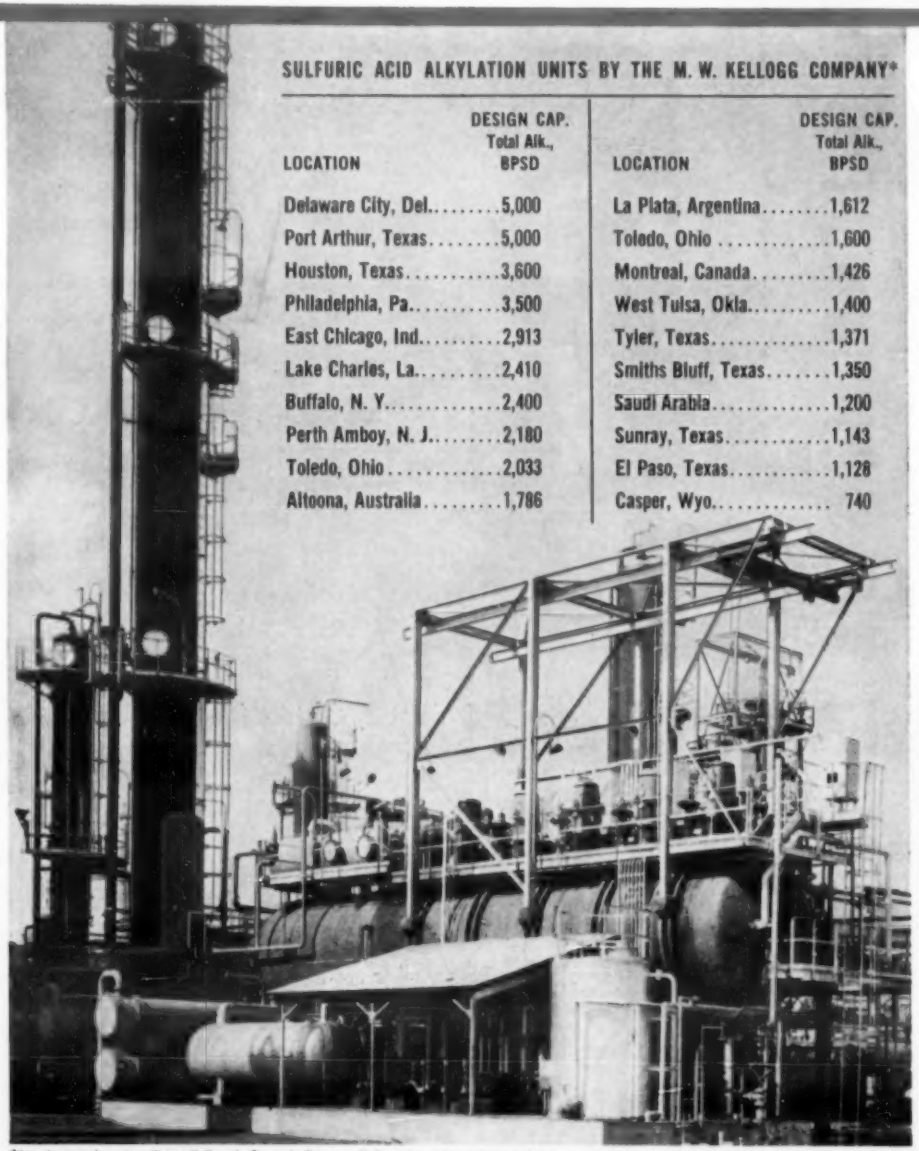

SULFURIC ACID ALKYLATION UNITS BY THE M. W. KELLOGG COMPANY*

LOCATION	DESIGN CAP. Total Alk., BPSD	LOCATION	DESIGN CAP. Total Alk., BPSD
Delaware City, Del.	5,000	La Plata, Argentina	1,612
Port Arthur, Texas	5,000	Toledo, Ohio	1,600
Houston, Texas	3,600	Montreal, Canada	1,426
Philadelphia, Pa.	3,500	West Tulsa, Okla.	1,400
East Chicago, Ind.	2,913	Tyler, Texas	1,371
Lake Charles, La.	2,410	Smiths Bluff, Texas	1,350
Buffalo, N. Y.	2,400	Saudi Arabia	1,200
Perth Amboy, N. J.	2,180	Sunray, Texas	1,143
Toledo, Ohio	2,033	El Paso, Texas	1,128
Altoona, Australia	1,786	Casper, Wyo.	740

*List shows only units utilizing Kellogg's Cascade Reactor. Kellogg has also engineered and built many alkylation units of other types.

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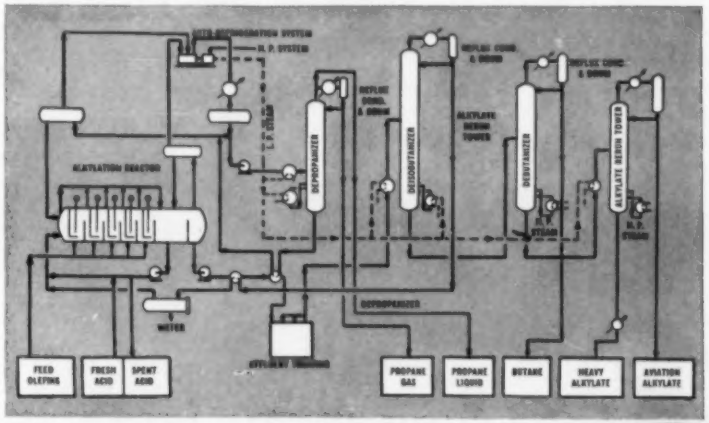
With its present advanced design, utilizing the company's unique multiple-stage cascade reactor and auto-refrigeration system, Kellogg alkylation offers the ultimate today in high isobutane efficiency, low acid consumption, low outlay for recycle and auxiliary equipment, and low utilities cost.

The M. W. Kellogg Company welcomes the opportunity to describe this alkylation process in detail, and to acquaint refiners with the improvements its engineers are continually making toward still greater economy and efficiency.



Refinery Process Division

The M. W. Kellogg Company

711 Third Avenue, New York 17, N.Y.

A SUBSIDIARY OF PULLMAN INCORPORATED

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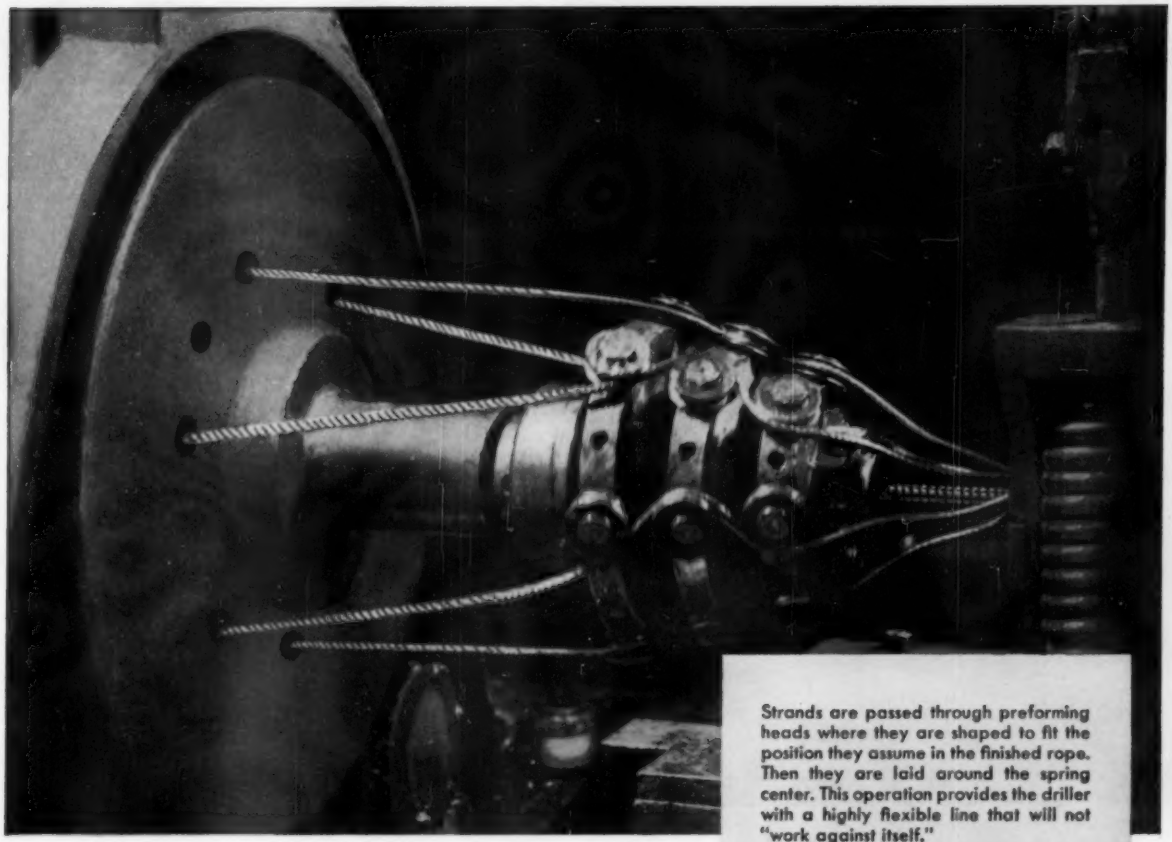
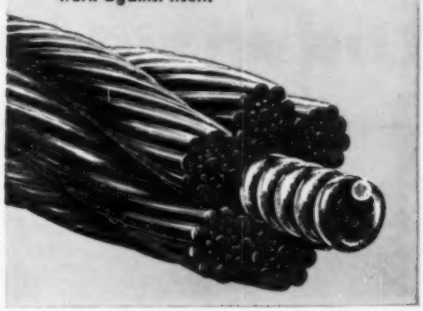


Strands are passed through preforming heads where they are shaped to fit the position they assume in the finished rope. Then they are laid around the spring center. This operation provides the driller with a highly flexible line that will not "work against itself."



SPRINGKORE

the wire rope designed for ROTARY DRILLING

SpringKore wire rope is specially designed to stand up under the line stresses of heavy-duty rotary rig drilling. The steel spring center enables SpringKore to "snap back" after the crushing action at the drum and to resist the severe wear at the crown and block sheave. Field tests prove that SpringKore retains flexibility and resistance to crushing longer than any other drilling line now in use.

The hollow inside center of the spring acts as a lubricant reservoir that provides complete lubrication of the rope's innermost parts for the entire service life. Its coiled spring shape gives the outer steel strands of the wire rope firm supporting points which reduce internal pressures and friction.

SpringKore rotary lines are immediately available in standard sizes. See your regular J&L supplier or send the coupon for complete information.

J&L STEEL

Jones & Laughlin

... a great name in steel

Jones & Laughlin Steel Corporation
Wire Rope Division
Muncy, Pennsylvania

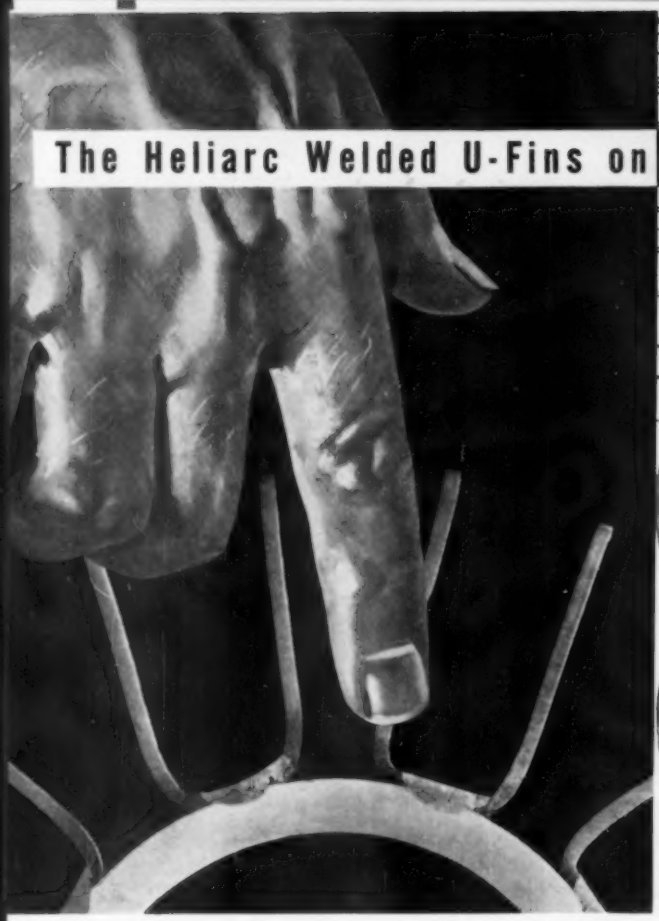
☐ Please send information on SpringKore.
☐ Have representative call.

Name_____

Title_____

Company_____

City_____ Zone____ State_____



The Heliarc Welded U-Fins on Every ALCOTWIN Fin Tube are

The Inside Reason for ALCOTWIN SUPERIORITY

The ALCO gas shielded tungsten arc welding method of fusing the fins to the tube leaves no discontinuities. As a result, the ALCOTWIN® heat exchanger has unequalled heat transfer efficiency. With the ALCO non-ferrous tube and fin combinations, use of intermediate high resistance bonding materials is eliminated, and design temperatures are limited only by the basic metal. This structurally strong bond assures permanent contact throughout thousands of heating and cooling cycles.

A wide range of metallurgies is available with the ALCOTWIN heat exchanger. Tubes and fins can be made of the precise materials to insure best results for your application. Combinations of carbon steel, stainless steel, low- and high-chrome alloys, non-ferrous alloys, such as Monel, Inconel, admiralty metal, cupro-nickel and copper, may be used.

There is no obsolescence with ALCOTWIN heat exchangers. They can be rearranged easily as loads and process requirements change. ALCOTWINS are in stock in Beaumont, Texas, now for immediate delivery when you need them. They are available *off the shelf* in a number of sizes, for pressures up to 600 psi and temperatures to 650° F. Pressures up to 10,000 psi and special metallurgy are available on order.

Complete information is available from any of ALCO's sales offices. For a copy of Bulletin FH-3, write Petroleum Industry Equipment Division, Dept. AW-4, P. O. Box 1065, Schenectady, New York.

ALCO

ALCO PRODUCTS, INC.

NEW YORK

Sales Offices in Principal Cities

Locomotives · Diesel Engines · Nuclear Reactors · Heat Exchangers · Springs · Steel Pipe · Forgings · Weldments · Oil-Field Equipment

GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified ORTAC for hot-oil cleaning of well casings
A
B
C
A Extra-tough cover resists weather, oil, sun, abrasion
B Vertical braids of high-tensile rayon cord for exceptional strength with great flexibility
C Tube that resists oil, gasoline, solvents, air and water
ORTAC (Oil-Resistant Tube and Cover) is available in long, continuous lengths in sizes from 3/16" to 1½" I.d.

One cleaning hose: 300 wells—well done

Cleaning paraffin from well casings – with oil heated to a smoking 170°F.–quickly burned the life out of the different brands of ordinary hose this Texas rig operator tried. In fact, 5 weeks' service was the record for any of them.

Then he called in the G.T.M. – Goodyear Technical Man. The recommendation: ORTAC – the rugged hose with a tube of oil-resistant synthetic rubber. To date, this hose has put in *two solid years of service – cleaned over 300 wells* and cleaned them well. And it's still going strong.

That's one more example of time- and money-saving help from the G.T.M. It's typical, too, of service from Goodyear hose and other industrial rubber products – throughout the oil fields. To cash in, contact the G.T.M. through your Goodyear Distributor–or by writing Goodyear, Industrial Products Division, Akron 16, Ohio.

ORTAC by

GOODYEAR

THE GREATEST NAME IN RUBBER

Ortac–T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

Engineering Progress Report

FROM UNION CARBIDE CHEMICALS COMPANY

Glycol Dehydrators give 90°F. Dew Point Depressions...

Improved regeneration systems give high glycol concentrations

There are two methods commonly used today to dehydrate natural gas: one employs glycols; the other, dry desiccants. Most authorities agree that glycol systems are less expensive in both initial and operating costs. Recent engineering advances now permit dew point depressions up to 90°F. with economical glycol-type dehydrators. Union Carbide Chemicals Company maintains an extensive engineering service group designed to help the natural gas industry obtain the best possible dehydration service with CARBIDE'S diethylene glycol and triethylene glycol.

A GRADUAL IMPROVEMENT

Diethylene glycol was first used to dehydrate natural gas in 1936 and by 1939 sixteen glycol type plants were in service providing average dew point depressions in the range of 40°F. Triethylene glycol was first used to dehydrate natural gas in 1949. The dew point depressions realized with glycol type plants have gradually increased until today the standard guarantee is a 65°F. depression or gas containing seven pounds of water per MMSCF, whichever first occurs. For sometime now, some equipment manufacturers have offered a 75°F. dew point depression guarantee.

FACTORS INFLUENCING DEW POINT DEPRESSION

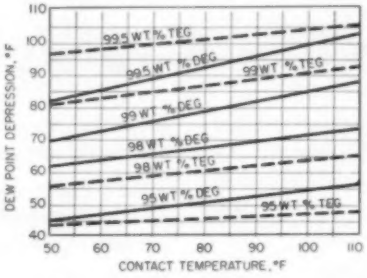
The dew-point depression obtained with a glycol dehydration plant depends upon several factors, such as:

1. Concentration of water in the lean glycol solution.
2. Glycol circulation rate.
3. Contact temperature in the top of the absorber column.
4. Efficiency of gas to glycol contact in the absorber.

Even with conservative design and operation, however, the dew point of the gas leaving the glycol contactor cannot be lower than the equilibrium value for the conditions of temperature and glycol concentration found on the top plate.

HIGH GLYCOL CONCENTRATIONS

The high diethylene and triethylene glycol concentrations now being obtained in plant practice, prompted studies to determine the dew point depressions obtainable with such solutions.



These data indicate that both diethylene and triethylene glycol at 99.5 per cent concentrations provide dew-point depressions in the 80°-105°F. range.

At concentrations of 98 per cent and lower, diethylene glycol provides better depressions than equal concentrations of triethylene glycol, while at 99 and 99.5 per cent concentrations, triethylene glycol appears to allow a 5°-10°F. lower dew point than diethylene glycol.

90°F. DEPRESSION MEETS TRANSMISSION REQUIREMENTS

Glycol regeneration equipment on the market today is capable of producing and maintaining glycol concentrations above 99%. Thus, it is possible for equipment manufacturers to guarantee a 90°F. minimum dew point depression. There are very few instances where a 90°F. depression will not meet the water content specifications of any long distance gas transmission company.

CARBIDE'S RESEARCH PROGRAM

Dew point depression studies are but one phase of CARBIDE'S extensive research activities designed to improve the products and processes of the natural gas treating industry. CARBIDE'S Technical Service Department stands ready to help you obtain the best possible results from your gas treating installations. For more information on the use of CARBIDE'S glycols for gas dehydration, call the nearest CARBIDE technical representative or write, Union Carbide Chemicals Company, Department B, 30 East 42nd Street, New York 17, N. Y.

"Union Carbide" is a registered trade-mark of Union Carbide Corporation

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30 East 42nd Street, New York 17, N. Y.

Easiest, fastest way to kill fire...
KIDDE'S NEW DRY CHEMICAL EXTINGUISHER

Here – from Kidde – is the newest, the fastest, the easiest-to-operate dry chemical fire extinguisher!

Look at the extra large, aluminum handle and trigger—even a gloved hand fits comfortably with room to spare. Pick the unit up – it hangs straight – no awkward angle to throw you off balance.

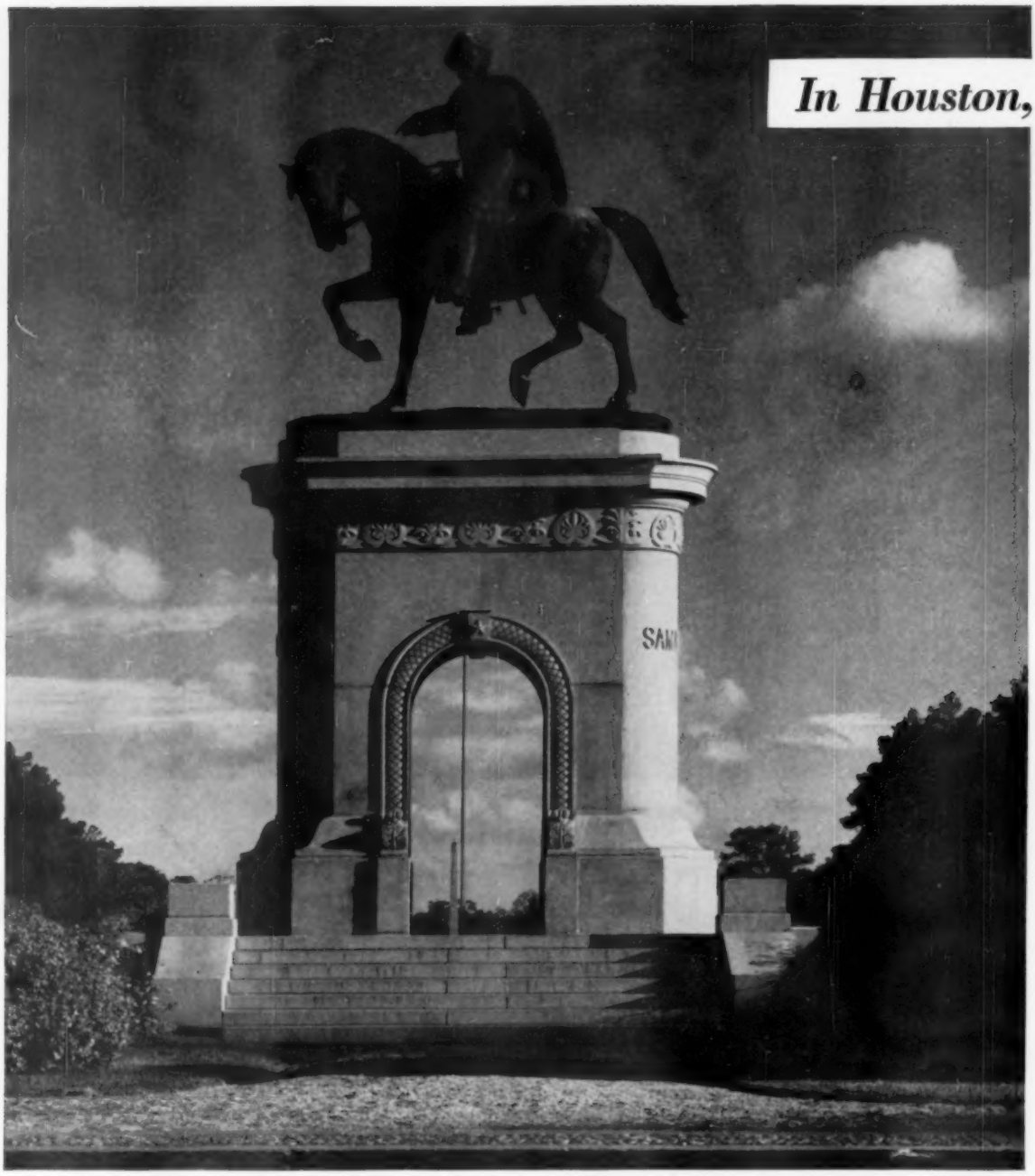
If fire strikes, follow the simple directions: "Remove Horn" – automatically the trigger safety lock is released – "Pull Trigger" – instantly a cloud of fire-killing dry chemical whooshes out of the nozzle and fire's out! With this unit, designed by Kidde engineers working with Henry Dreyfuss personnel, you don't have to be a trained fireman to get perfect results.

Built for a lifetime of use, the handsome new 20 and 30 pound Kidde dry chemical extinguishers have top ratings from Underwriters' Laboratories, require only 225-250 psi charging pressure. The rugged pressure gauge is recessed in handle for maximum protection. Tells at a glance if the unit is ready for use.

Available nationally through Kidde's sales and service organization. Write Kidde today for the name of nearest distributor.

Kidde

Walter Kidde & Company, Inc.
1154 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd., Montreal—Toronto



Sam Houston Momument, Entrance to Hermann Park, Houston, Texas

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

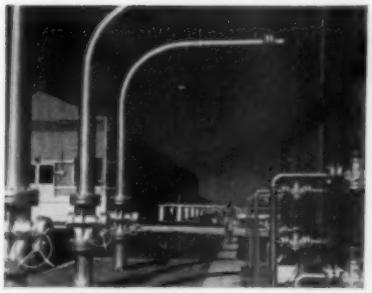
as in major oil centers everywhere...

REPUBLIC IS A MAJOR CASING AND TUBING SUPPLIER

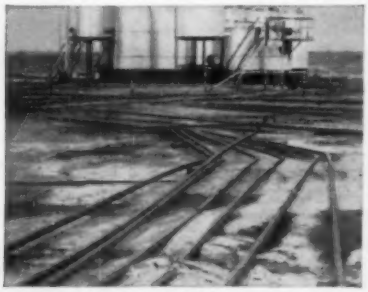
Located in the heart of the oil-rich Gulf Coast District, the city of Houston, Texas, for years has been a strategic center for the oil industry. Continuation of this position of leadership is assured by the growing number of producing wells in the area.

In order to be of maximum service to the dynamic oil industry, Republic has made every effort to help meet tomorrow's heavy demand for oil country tubular goods. For example, Republic's production of casing and tubing has been raised 300% in just the last half dozen years. As a result, Republic is a major casing and tubing supplier in oil fields everywhere. This tremendous rise in quantity has been brought about with no sacrifice in traditional top quality.

Whether you specify electric weld or seamless, you can count on unexcelled performance in every foot of Republic Casing and Tubing. For full information send coupon.



REPUBLIC ALLOY STUDS are noted for their uniform strength, and accurate, full-formed threads. They tighten smoothly and back off easily when required. High tensile strength, plus tough threads provide powerful clamp action essential in high pressure equipment. Specify Republic Alloy Studs for utmost dependability. Send coupon for facts.



HIGH STRENGTH, LOW WEIGHT EQUIPMENT required in many oil field operations depends on tough, strong, shock-resistant Republic Alloy Steels. Excess bulk and weight can be eliminated with no sacrifice of safety or performance. Applications include blocks, tongs, bits, draw works components. For full details, mail coupon.

INTEGRATED CONTROL ASSURES UNIFORMITY in all Republic Oil Country Tubular Goods. Result is time-saving workability and in-service dependability. Republic's complete line of pipe products range from continuous butt weld, shown here, to big diameter fusion weld line pipe. Mail coupon for data on sizes and types.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. C-4488
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Please send me more information on:

☐ Electric Weld Casing and Tubing ☐ Alloy Studs
☐ Seamless Casing and Tubing ☐ Alloy Steels
☐ Oil Country Pipe Products

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Fig. 3466 Horizontal Triplex Plunger Pump. Maximum speed, 250 RPM. Maximum capacities and pressures: 91 barrels per hour at 1180 PSI; 179 barrels per hour at 600 PSI. Write for 1958 catalog.

THAT'S WHY WE'VE ADOPTED THEM AS STANDARD

We experimented a long time—and found, when the returns were in, that we got more of what we want in Gaso Pumps. More in adaptability to various conditions. More in day-in and day-out dependable performance. More in operating and maintenance economy, and more in service life. That, in a nutshell, is why we wrote GASO into our standard pump specifications, and why we consider the policy a short cut to the results we want in pumping service.

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TULSA, OKLAHOMA
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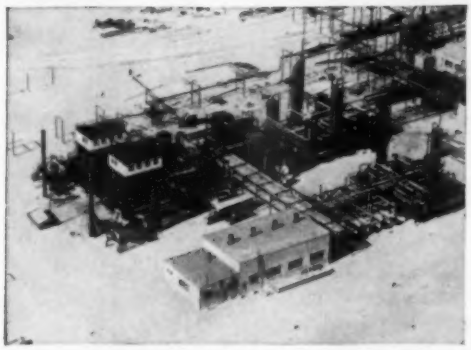
GASO PUMPS
for every oil industry need

HYDROGEN

...how much do you need?

Girdler offers you complete engineering-construction service for BIG-CAPACITY *plants*



When you plan facilities for "tonnage hydrogen" for treatment of refinery feed stocks and hydrocarbon products, it will pay you to take advantage of Girdler experience.

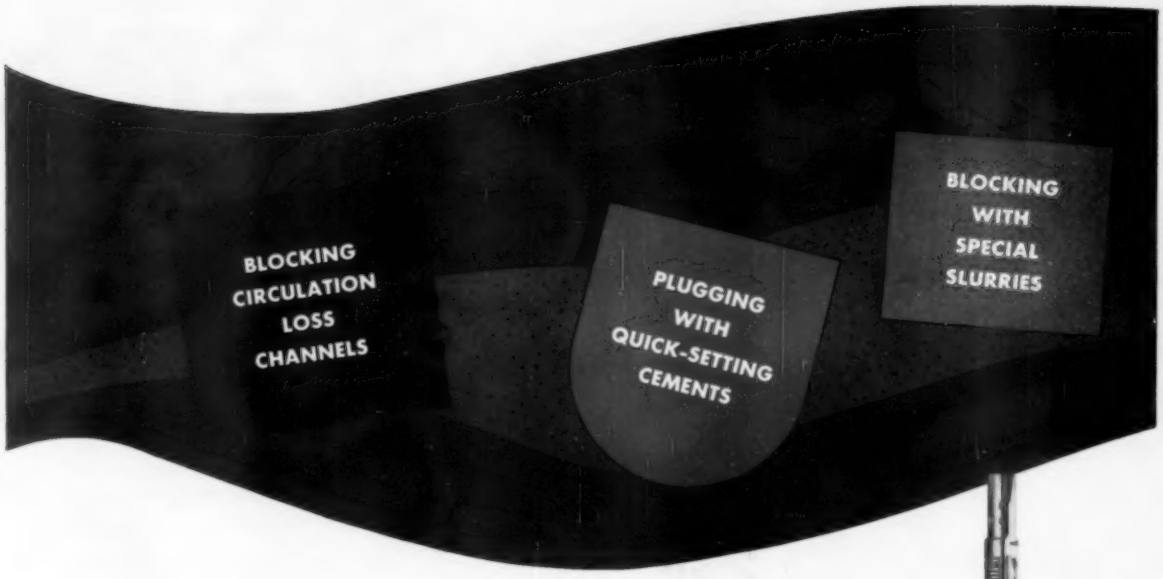
Big plant experience: Girdler has designed and constructed large plants for petroleum products and chemicals. Two hydrogen plants have been built each of which can produce gas at the rate of seventy million cubic feet per day. More than 45 Girdler hydrogen plants are giving outstanding performance in the United States and Canada.

Girdler manufactures all of the catalysts used in Girdler hydrogen plants. These catalysts permit high production rates.

Call or write for complete information

The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY
GAS PROCESSES DIVISION • DISTRICT OFFICES: New York, San Francisco



PROBLEM: LOST CIRCULATION

SOLUTION: HALLIBURTON "STOP-LOSS" TECHNIQUES

For solving such costly lost circulation problems as the continuing loss of drilling fluid or cement into crevices, fissures or vugs... Halliburton "stop-loss" techniques restrict these losses to a minimum. The result is more profitable well operation.

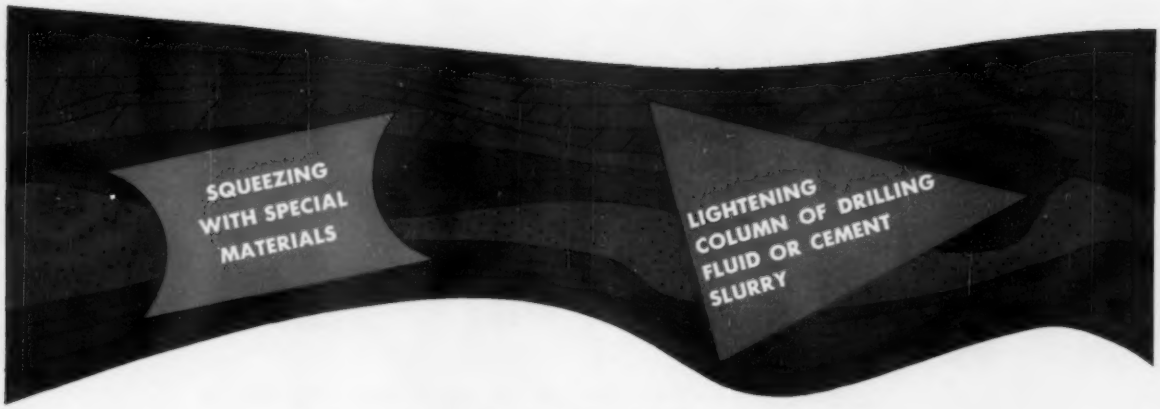
Because lost circulation may result from any of a number of causes, no single technique offers a universal solution to all such problems.

To meet the various types of circulation loss problems, Halliburton has devised a number of remedial techniques. By means of blocking, plugging, or squeezing operations, or by lightening the column of drilling fluid or cement slurry, circulation losses may be eliminated or substantially reduced. Many special lost circulation materials aid in increasing the effectiveness of "stop-loss" techniques.

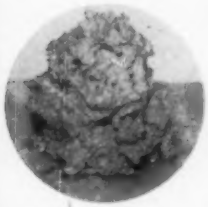
To get the benefits of Halliburton lost circulation service for your well, call your nearby Halliburton representative for his specialized assistance.

HALLIBURTON

OIL WELL CEMENTING COMPANY, DUNCAN, OKLAHOMA



SPECIAL TOOLS AND MATERIALS MAKE HALLIBURTON "STOP-LOSS" TECHNIQUES MORE EFFECTIVE

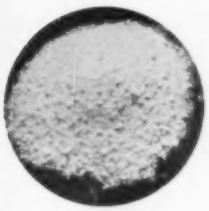


BENTONITE DIESEL OIL (BDO)

...a thin slurry of bentonite in diesel oil, BDO is pumped down the drill pipe to mix with the drilling mud and form a sticky, putty-like material to shut off circulation loss.

TUF-PLUG

...a special blend of graded ground walnut shell used as additive in cement or drilling mud, often provides an effective seal to shut off wide fractures.

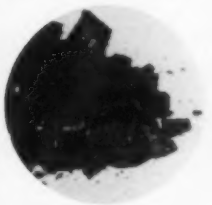


PERLITES

...a lightweight material in granular form, expanded Perlites are used both as a blocking agent and as a fluid column weight reducer.

PALCO SEAL

...composed of redwood fibers, offers economy and versatility for lost circulation problems with drilling fluids.



BLOX-ALL

...a chemical solution pumped into the well as a liquid, it thickens into a gelled material in the drill pipe, then is extruded into the lost circulation zone where it sets to form a stiff, rubbery mass.

HOWCOGEL

...produced from carefully selected Wyoming bentonite, combines with water to form a high strength gel to hold lost circulation materials in suspension in drilling mud or cement during placement.

OPEN-HOLE TREATING PACKER quickly locates and then treats lost circulation zones in open holes, with just one trip into the hole. Can be set, moved and re-set until zone is pinpointed, then blocking agent is placed through same packer. Lengthy anchor is not necessary because lateral expanding slip assembly makes this unique packer completely independent of the distance from the bottom of the hole.

CEMENTING SERVICES

284 SERVICE CENTERS . . . TO SERVE YOU BETTER

IN VENEZUELA

6 YEARS DRILLING WITHOUT OVERHAUL

UNIT RIG DRAWWORKS

Another Unit Rig Drawworks has chalked up an outstanding operational record. In Venezuela, this U-15 drawworks drilled for six years without requiring a single major repair. Put into operation by Loffland Brothers Company of Venezuela in 1951, this rig has drilled 78 wells, a total of 633,729 feet, with an average well depth of 8124 feet. For information on a Unit Rig to fit your drilling requirements anywhere in the world, contact your Mid-Continent representative.

Shown in operation in Venezuela is the Unit Rig U-15 drawworks powered by Cummins LRI-600 engines.

EXCLUSIVE EXPORT DISTRIBUTOR

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MID-CONTINENT Supply Company

MID-CONTINENT BLDG. FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

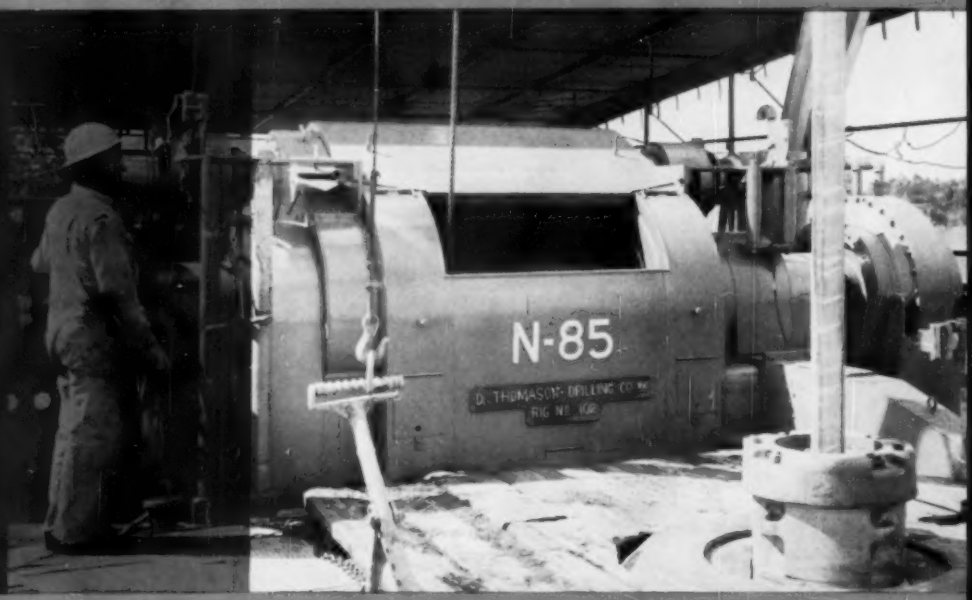
MORE FOR YOUR DRAWWORKS DOLLAR

Here is the "Big Rig" of the medium-deep to deep drilling class drawworks. Designed from drum to pump drives on the identical pattern used in Brewster's 1,000 h.p. to 1,600 h.p. drawworks, the N-85 has an unmatched reserve of strength and speed.

Compare these N-85 features with any 10,000-plus foot drilling rig: Graduated-power four speed chain transmission with gear reverse; Air actuated high and low drum clutches giving 8 hoisting speeds; Four rotary speeds direct from transmission; Choice of heavy-duty in-line or sectional compounds; Two pump drives mounted at rear of compound.

Priced competitively with ordinary medium-deep drilling equipment the Brewster N-85 is the best drawworks buy for your drilling dollar.

N-85



BREWSTER N-85 DRAWWORKS

Reserve Powered for 10,000-plus foot Drilling

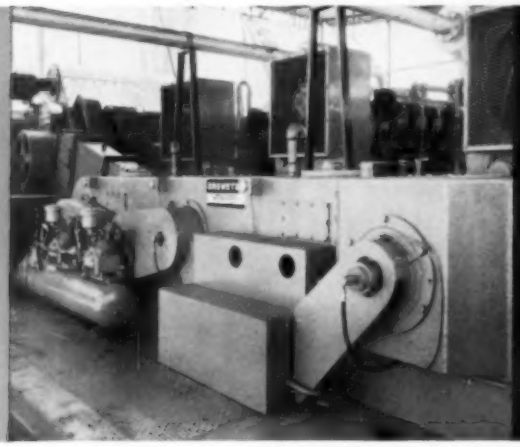
Prove to yourself that you can have more drawworks without increasing equipment costs . . . write for the Brewster N-85 Reserve Power story today.

Shreveport, Louisiana

BREWSTER

MORE HOISTING SPEEDS

The "Big Rig" graduated speed transmission has four forward and one reverse speed, each a 38% increase. Combined with high and low clutches at the drum, the N-85 offers eight evenly spaced hoisting speeds. The rotary has four speeds direct from the transmission.



MORE COMPOUND STRENGTH

The N-85 offers the same choice of heavy in-line or sectional compounds available on Brewster's largest drawworks. Heavily chained and lubricated by splash and pressure systems both compounds are designed for hardest service. Alternate arrangements for step-down compounds or for fluid or torque converter drives can be specified by the purchaser.

MORE FLEXIBLE PUMP DRIVES

Two pump drives are pedestal mounted at the rear of the compound. Their location eliminates the use of idlers or need for notching the substructure to provide belt room. The driller can operate one or both pumps from air controls at the control panel.

SPECIFICATIONS

Recommended Available H. P.	850
Drum Brakes Diameter x Width	48" x 10"
Drum Core Diameter x Length	24" x 50"
Transmission Forward Speeds	4
Transmission Reverse Speeds	1
Overall Height	7' 3"
Overall Width	9' 0"
Overall Length	27' 6"
Approximate Weight (Less Hydromatic)	27,000#

THE BREWSTER COMPANY, INC.

Shreveport, Louisiana

BREWSTER MATCHED EQUIPMENT

500 Ton Traveling Block — *RSH-18 Oilbath Rotary Table* — *7-SX Oilbath Swivel*

SUPPLY HOUSES

Howard Supply Company • Apex Equipment Company • Bovaird Supply Company • Industrial Supply Company • Murray Brooks, Inc. • United Supply and Manufacturing Company • Export Sales: The Brewster Company • (HOMCO) Houston Oil Field Material Company, New York, N. Y., Houston, Texas; Mexico City, D. F.

Specification, Design, Fabrication Data on Aluminum Tanks and Vessels

Now complete information is available—from Reynolds Aluminum—on the specification, design and fabrication of aluminum for tanks and vessels.

A new brochure, "Reynolds Aluminum for Tanks and Vessels" gives the engineer and designer:

1. A comprehensive list of products which can be satisfactorily stored or handled by aluminum.
2. Specific design data and formulas for use of aluminum in tanks and vessels.
3. Tables on the factors to be considered in design: allowable stress values in tension, allowable efficiencies for arc and gas welded joints, stresses, gauge requirements, etc.
4. Fabrication data and considerations.

Aluminum is the ideal metal for a host of process shipping and storage tank applications: it resists corrosion well, it costs less than other corrosion-resistant metals, it is non-sparking, it has ideal thermal properties, it is easy to fabricate and weighs ⅓ as much as steel.

Learn how to take advantage of these properties, with Reynolds new authoritative brochure, "Reynolds Aluminum for Tanks and Vessels". Send in the coupon below, today . . . or call your local Reynolds office.

Watch Reynolds All-Family Television Program "DISNEYLAND", ABC-TV.

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

Reynolds Metals Company
P. O. Box 1800-CR, Louisville 1, Kentucky

Please send me a copy of your brochure, "Reynolds Aluminum for Tanks and Vessels".

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COMPANY_____

ADDRESS_____ CITY_____ STATE_____

"It has always been the policy of our company . . . to stay out of politics in the countries where we are guests. Foreign affairs are not our business. But peace is our business everywhere. . . . Energy consumption is hurt, not helped, by conflict—and energy consumption is greatest in peaceful lands where the largest numbers of people are prospering."

— Eugene Holman, Chairman of the Board, Standard Oil Company (New Jersey)

ESSO 75 YEARS

producing energy for an abundant life

STANDARD OIL COMPANY (NEW JERSEY)
AND AFFILIATED COMPANIES

are you pumping red tape?

If you are there's no quick, easy solution to your problem. But an answer must be found. The red tape of oil operation can choke production as surely as a well that is sanding up. These higher operation costs can cut your profit to the point that you are working only for your creditors.

Although you have no control over your sales price, you can control your costs. Working with your legal and tax counsel, The Commerce can analyze your costs, find where economies can be effected, thereby increasing the profitableness of your operation by helping you to cut your costs. Your income goes up when you stop pumping red tape.

Facilities of The National Bank of Commerce Oil Loan Department are available in Wyoming, Nebraska, Colorado, New Mexico, Texas, Louisiana, and Mississippi.

E. O. Buck, vice president, Oil Loan Department

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

THE NATIONAL BANK OF

COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas

UNIBOLT
flow manifolds

fit your pressures as well as your pocketbook

These are the Christmas tree manifolds that are custom-built to any operator's flow control needs, but at no premium in price. Unlike manifolds of fixed design, UNIBOLT permits complete flexibility in arrangement of its units. Components may have threaded, flanged or UNIBOLT connections. They may be of malleable, regular steel, alloy or SA* stainless, depending upon pressures and service. The chokes may be adjustable or positive with interchangeable flow-rated beans or X-beans. Tee type for single wing or cross type for double wing trees are available. Select exactly what you need for the well. Later on you may salvage the entire manifold as a unit or as individual parts for use elsewhere. By any yardstick, UNIBOLT Flow Manifolds give you far more desirable features . . . at a reasonable cost.

*Special Analysis

10,000 Lb. WP — Alloy Steel or SA* Stainless

5,000 Lb. WP — Alloy Steel or SA* Stainless
3,000 Lb. WP — Carbon Steel or SA* Stainless

3,000 Lb. WP — Carbon Steel or SA* Stainless
5,000 Lb. WP — Alloy Steel or SA* Stainless

3,000 Lb. WP — Carbon Steel or SA* Stainless
5,000 Lb. WP — Alloy Steel or SA* Stainless

THORNHILL
P. O. BOX 1184

CRAVER CO.
HOUSTON, TEXAS

Tank leakage like this was stopped with gasketing of NEOPRENE

Two bolted steel tank batteries used to store crude oil offer dramatic proof of neoprene's usefulness in oil field operations. Operated at wellheads in the same field near Odessa, Texas, both batteries were gasketed in 1948 by National Tank Company of Tulsa, Oklahoma.

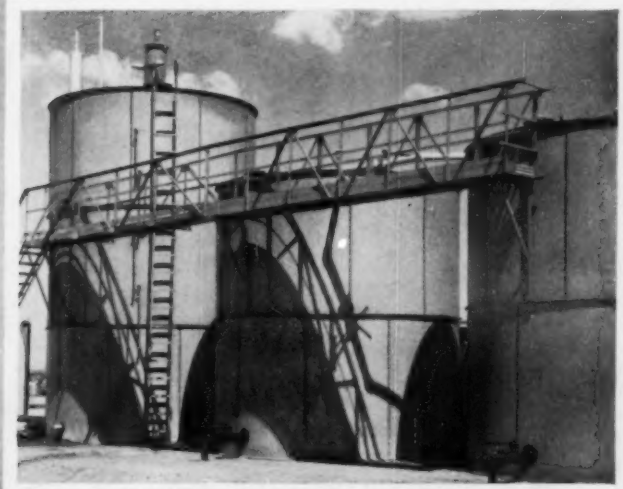
One battery (two 500-barrel and one 750-barrel tanks) was gasketed with neoprene especially developed for this use. Cloth insert natural rubber was used to gasket the other battery.

Within 6 months the rubber-gasketed tanks showed seam leaks. They have become steadily more numerous. But the tanks gasketed with neoprene are still free of any leakage after 9 years. The reason: neoprene's unusual resistance to the deteriorating effect of oil.

Grease and oil resistance is only one of neoprene's many useful properties. This Du Pont synthetic rubber also resists sunlight and weather, heat, aging, flex cracking, abrasion . . . just about every condition encountered in oil field operations.

Next time you're buying gasketing material, rotary drilling hose, pipe wipers or any other oil field rubber products, specify NEOPRENE. It will save money and time for you. E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept., Wilmington 98, Delaware.

◀ Rubber-gasketed tanks show many seam leaks.



▲ Tanks gasketed with neoprene show no leaks after 9 years' use.

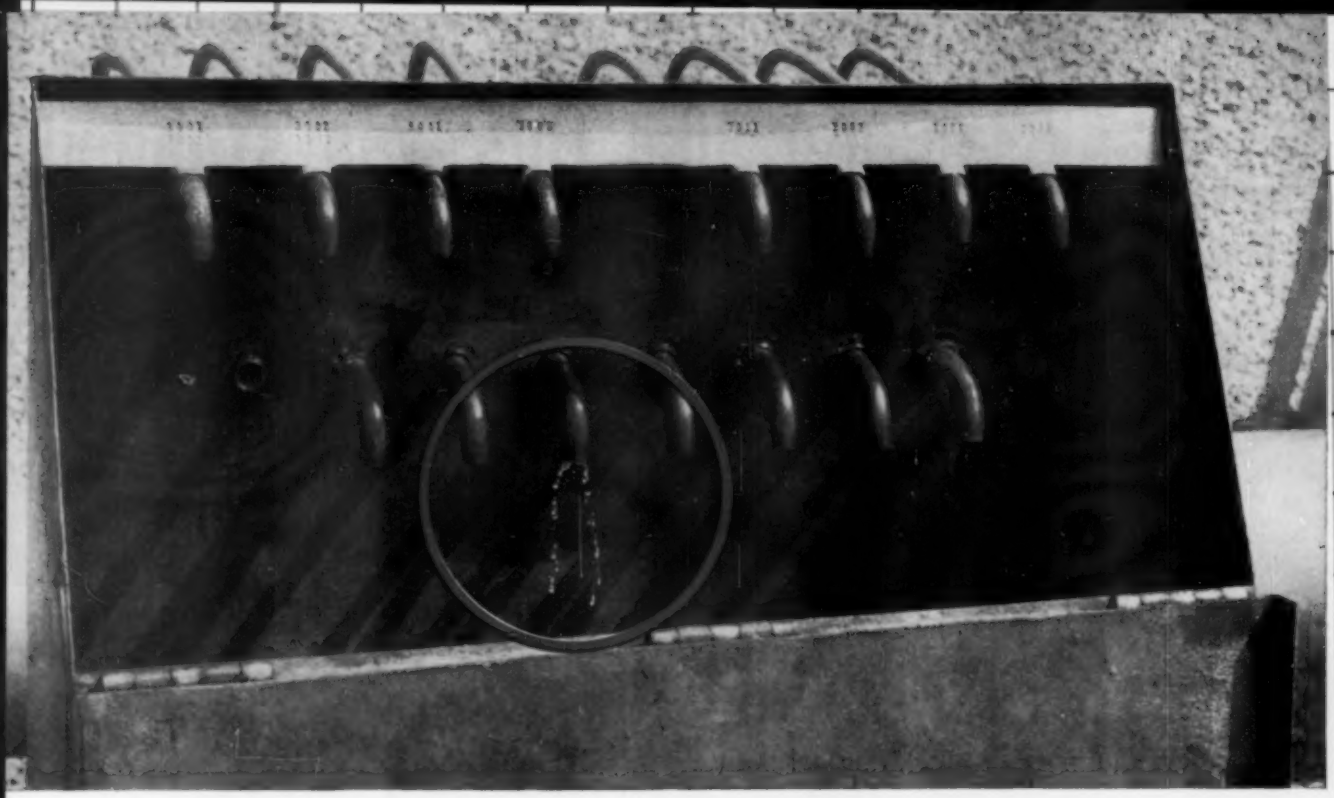
NEOPRENE

MADE BY DU PONT FOR 25 YEARS

DU PONT

REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . through Chemistry

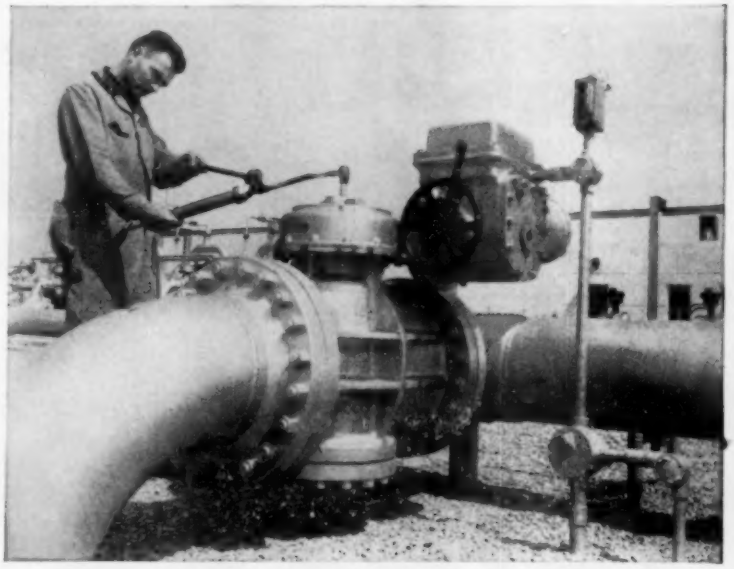


HOW TO
PREVENT VALVE LEAKAGE

The tell-tale trickle of gasoline from the one spigot above shows clearly that one valve is leaking. With most valves, this is a clear-cut signal to reseat . . . a costly, time-consuming job.

The man at the right, is reseating a valve the easy, economical way—he's lubricating a Rockwell-Nordstrom valve. The lubricant in a Rockwell-Nordstrom valve is actually a *permanent soft seat* that insures positive shut-off yet is instantly replaceable without interrupting valve service.

With the advantages you can only expect from a lubricated mechanism, it's easy to see why Rockwell-Nordstrom valves work better, stay in service longer and cost less to use. And, they cost no more to buy—often less—than ordinary valves. Available in a complete line for every pipeline need. For more information, write: Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.



ROCKWELL-Nordstrom VALVES

Lubricant Sealed For Positive Shut-Off

New RCA VHF Radiotelephone

...TURNS TALK INTO MORE EFFICIENT WORKBOAT OPERATIONS!

With RCA's new ET-8058 6-channel VHF Radiotelephone you get quick, dependable contact between shore-based offices and vessels, intership contact, safety and calling channels and public telephone correspondence service when used in conjunction with AR-8519 Auxiliary Receiver. You make as many calls as you want—no waiting for a line, no delays in giving or receiving information. Just pick up the phone and schedule, dispatch, report and institute last minute changes that cut hours off job-to-job sailing... improve overall operating efficiency... assure less waste, more profits!

If you operate workboats, fishing craft or small vessels in harbors, at sea or in inland waterways, you'll find this rugged RCA radiotelephone invaluable for 101 uses during the busy days ashore or afloat. Write for bulletin M-3005 giving complete product information and specifications.

• DEPENDABLE
• ECONOMICAL
• FLEXIBLE!

- **Covers any six channels within a 1.1 mc range in 148-174 mc band**
- **30 watt output**
- **Remote frequency control**
- **Automatically reverts back to any predetermined channel after completion of call**
- **Operates on 115 V AC, 60 cycles**
- **Control unit provides for channel selection, power on-off, volume control, squelch, dimmer control**
- **FCC type accepted!**

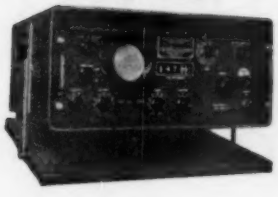
AUXILIARY RECEIVER—Model AR-8519 Auxiliary Receiver adds further versatility to the RCA VHF Radiotelephone system... provides facilities for transmitting on one frequency while receiving on another during the same transmission!

Write for free information today!

Other RCA Marine Equipments for the Workboat Fleet

RADAR—RCA's CR-105B "workhorse" radar as an aid to safe navigation through foul weather and other traffic hazards. Ideal for vessels with space and power limitations. Indicator requires only two square feet of deck space, antenna is lightweight. Provides instant selection of 1-2-4-12-32-mile ranges on bright 10-inch scope.

DEPTH RECORDER—RCA Model LAZ-13A Recording Depth Sounder Echograph accurately records depths, warns of rocks, wrecks and other underwater hazards. A sensitive, accurate navigational instrument. Ideal for fishboats, workboats, all small craft!



LORAN—RCA LR-8803 Direct-Reading Loran is compact, economical, easy to operate! Make quicker, safer passages using Loran system of long-range radio navigation.

RCA Tmk(s)®

RADIO CORPORATION of AMERICA

RADIOMARINE PRODUCTS
75 VARICK STREET
NEW YORK 13, N.Y.

A pipeline pumping station—powered by a gas turbine and equipped with a heat exchanger—has a decided economic edge over other stations. Manpower, for example, is as little as 20% of that needed by stations powered by diesel, steam or gas engines.

What part does the heat exchanger play? If it's an APCO extended sur-

face regenerator, it can recover up to 80% of the available heat in the gas turbine exhaust . . . and thereby cut fuel by 30%.* What's more, it takes less than 500 manhours to erect a unit on a 5000 hp cycle. Maintenance needed thereafter: zero. For details, contact:

Air Preheater Corp.,
60 E. 42nd St.,
New York, N. Y.

*At 1500 F, a 6-1 pressure ratio, and a designed effectiveness of 75%.

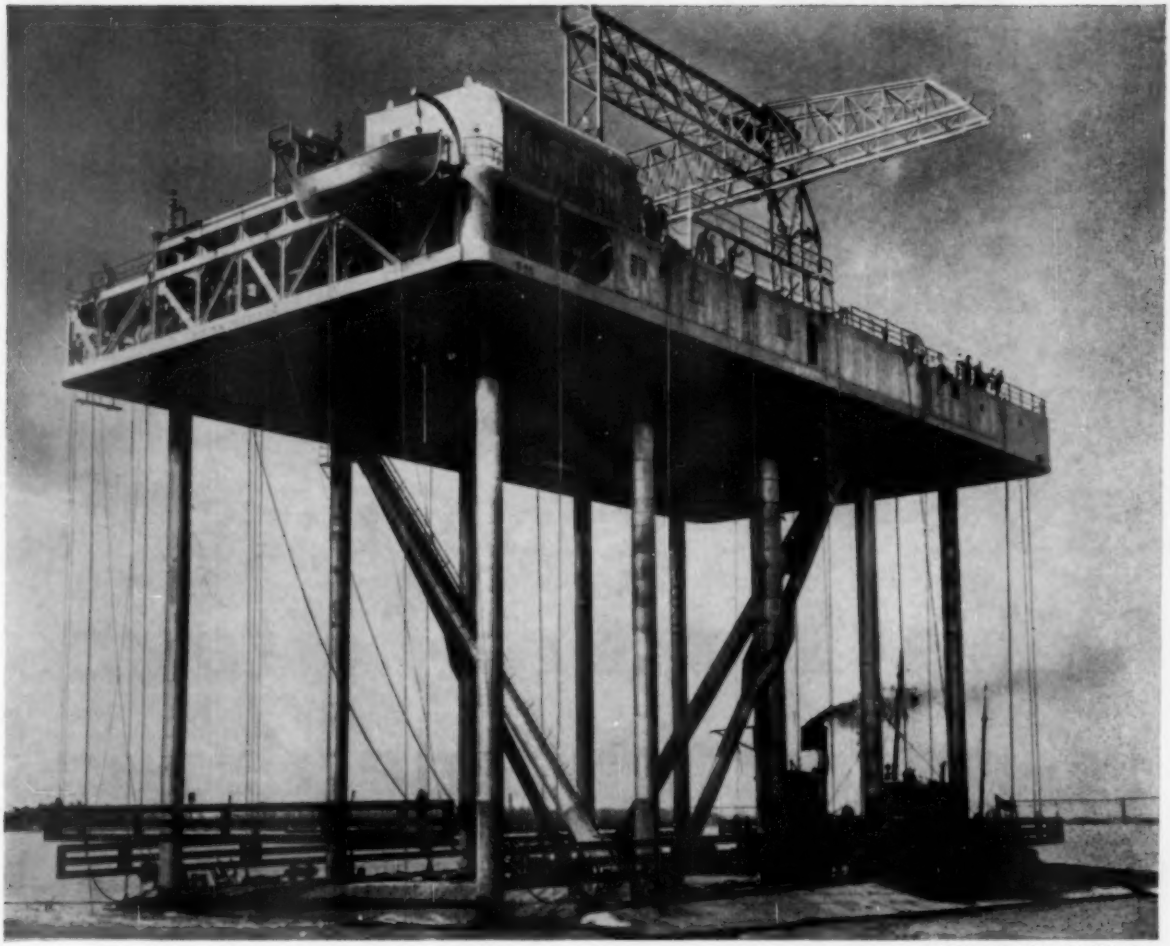


Photo courtesy of Avondale Marine Ways

Offshore rig . . . its giant legs are sheathed against corrosion with Monel

This is the S-55 . . . one of the largest offshore drilling rigs ever launched at New Orleans.

Its giant legs support the 150 x 190-foot elevated deck drilling barge . . . complete with crew quarters, gear, heavy machinery, 140-foot derrick.

They also take the brunt of the sea's constant attack . . . smashing waves, battering from floating equipment, the bite of corrosion.

Monel sheaths shield steel in 65-foot critical zone

The rig is sunk to bearing in waters 45 to 50 feet deep. Over all, some 65 feet of supporting structure may be exposed to splash corrosion . . . the kind most harmful to steel . . . where neither paints nor sacrificial anodes provide adequate protection.

In this critical 65-foot zone, welded 0.031-inch thick Monel* nickel-copper alloy sheathing covers and protects every square inch of the legs.

Monel alloy has proved by far the most practical way to control splash corrosion. It has been used on offshore drilling structures since 1949 and, more recently, on coastal radar "islands".

New developments in corrosion prevention come thick and fast. Before you finalize metal specs, talk them over with Inco's Development and Research Division.

*Registered trademark

Improve your selection of metals for petroleum production equipment. Write today for the Inco booklet, "Metals to Make Petroleum Production Equipment Produce More."

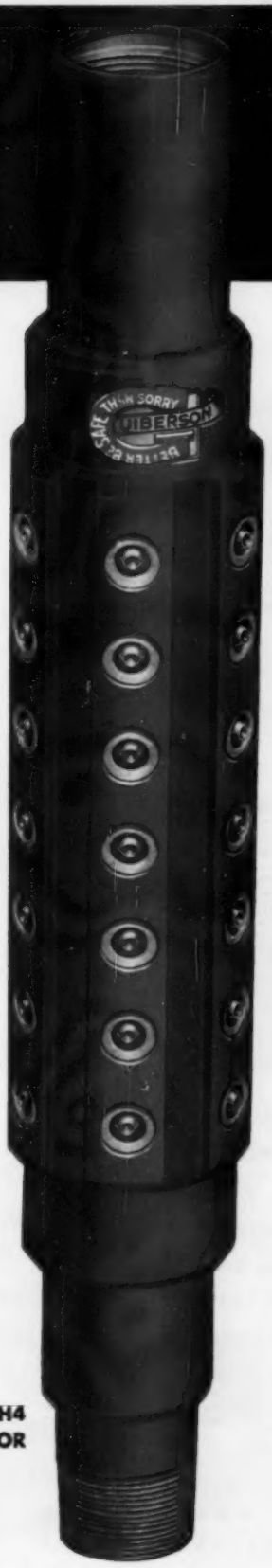
The International Nickel Company, Inc.
67 Wall Street New York 5, N. Y.

INCO NICKEL ALLOYS

GUIBERSON'S TYPE H4 *Hydraulic Anchor*

with

MORE FLUID BYPASS



TYPE H4 ANCHOR

The channeled body H4 Anchor gives you four operational improvements — faster going in, better circulation in the hole, faster pulling out and simpler clean-up.

Completely automatic in operation, the H4 incorporates a body designed for unusually large bypass area and tremendous holding power. It has a husky fishing connection on top. Case hardened piston slips are retained by a stainless snap ring that holds the slips in retracted position while going in or pulling — keeps the slips from dragging on the casing wall.

We recommend the H4 for holding down production-type packers in acidizing, fracturing or other below packer pressuring operations. The H4 not only improves circulation, but speeds up operations and cuts down maintenance costs.

Guiberson H4 Anchors are individually tested and available in a full range of casing sizes.

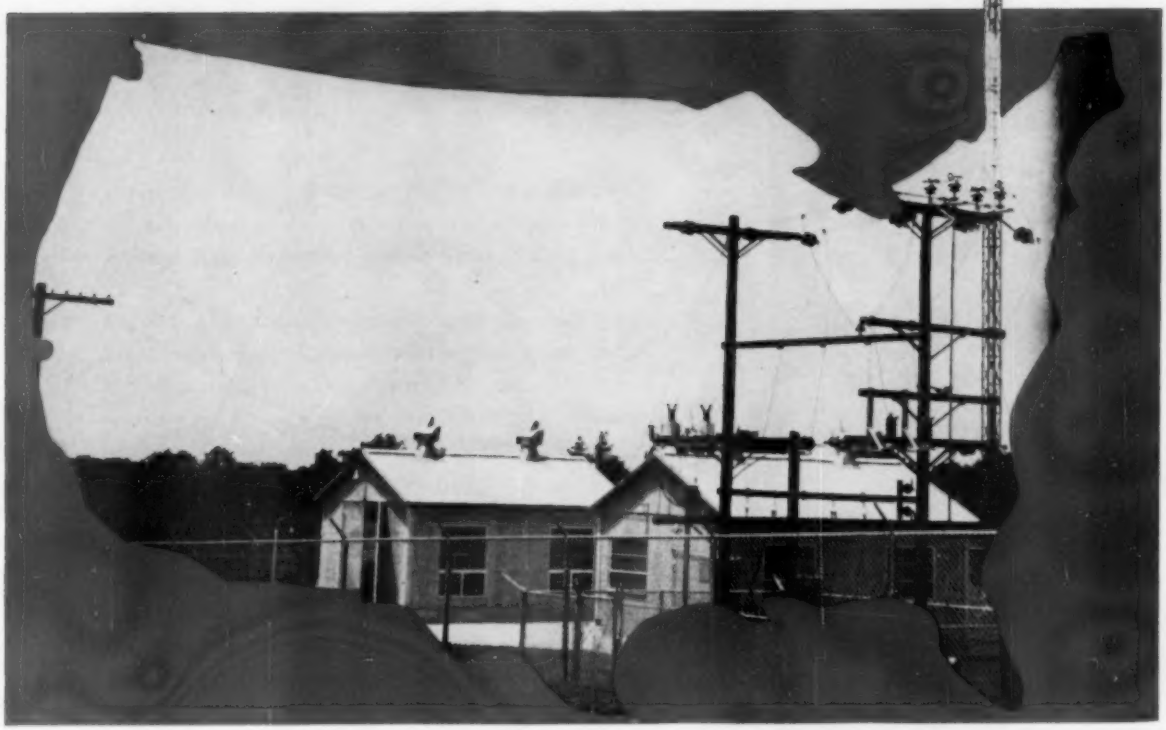
GUIBERSON

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

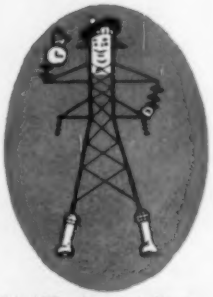
Sold by
Oil Field Supply Stores
Everywhere

ELECTRIC POWERED MICROWAVE CONTROLLED PIPELINE STATIONS NOW SPAN AMERICA...



One of many ways progressive management puts UTILITY ELECTRIC POWER to work

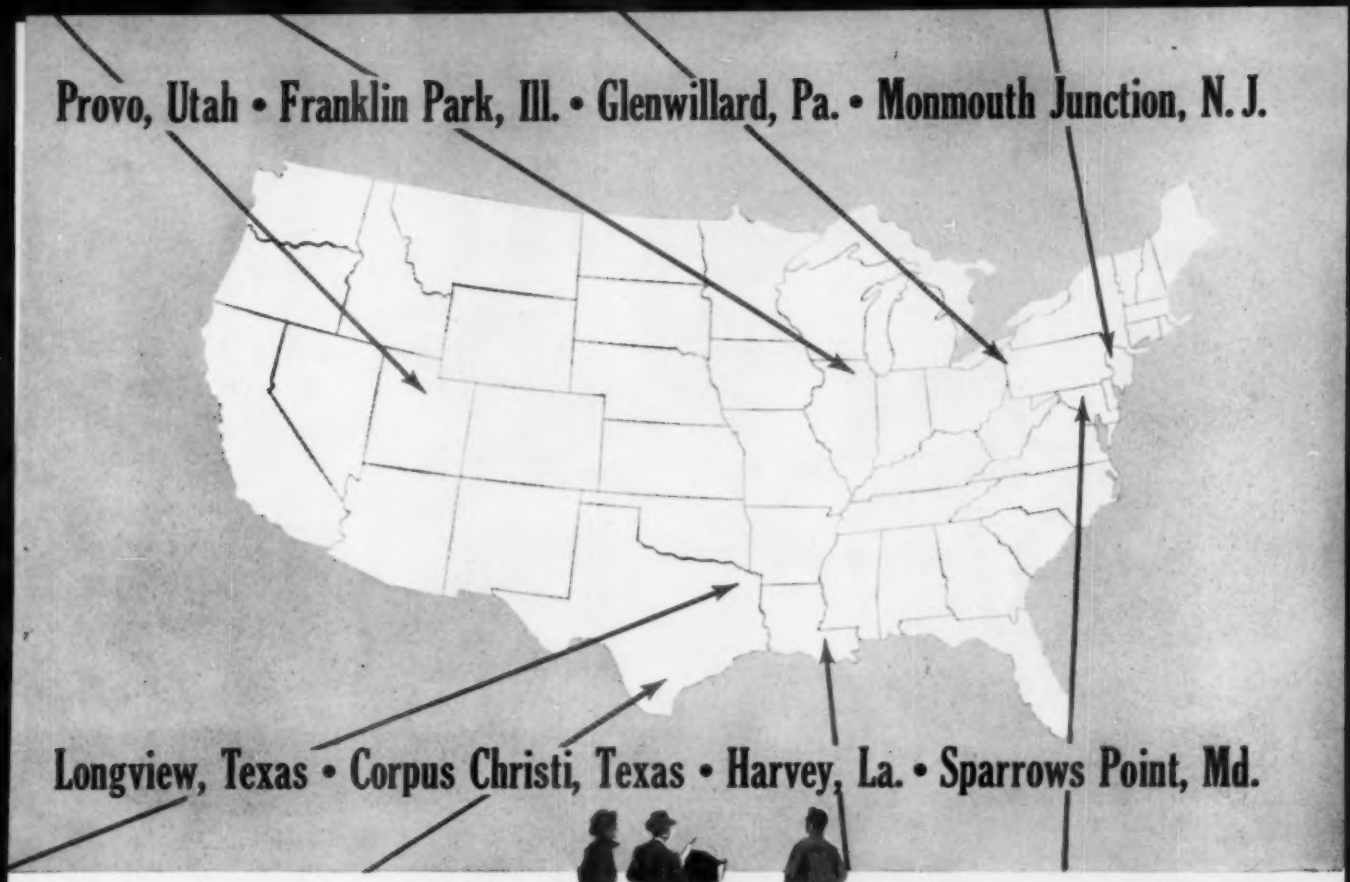
If you are in the pipe line transmission business . . . or if you contemplate having anything to do with pipe line transmission operations, don't sign any contract for power until you have carefully investigated the advantages of UTILITY ELECTRIC POWER. Of the 686,000 miles of pipe line systems in America, a big percentage of these is operated by Electric Power. When you have deliveries to make – at low cost – do it the modern, progressive way. Use UTILITY ELECTRIC POWER.



I'M LCP – Low-Cost Power on the Job 24 Hours Daily

PETROLEUM ELECTRIC POWER ASSOCIATION

P. O. BOX 35006 DALLAS, TEXAS


Provo, Utah • Franklin Park, Ill. • Glenwillard, Pa. • Monmouth Junction, N. J.
Longview, Texas • Corpus Christi, Texas • Harvey, La. • Sparrows Point, Md.

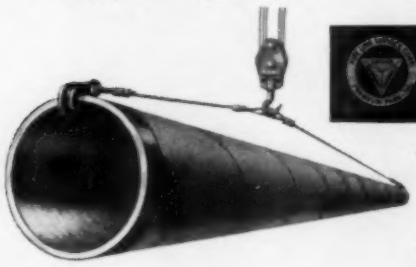
Pipe Protection

strategically located

to save you time and money!

Pipe Line Service has eight fully equipped wrapping plants to serve the major steel pipe producing areas in the country! These eight modern plants are strategically located to serve you as the pipe leaves the tube mills, en route to destination, or at a plant in your operating area. Strategic location is more than just convenience—it means substantial savings in storage and handling, lower through-freight costs, and less delivery time to jobsite.

What's more, these plant locations mean that, wherever you buy your pipe, you can get a uniform coating and wrapping job at a nearby PLS plant—no long shipping delays. If needed, you can have pipe wrapped at more than one PLS plant, delivered to the same jobsite, and be sure there is no difference in quality. Call in your nearest Pipe Line Service representative on your next coating job—he'll show you how PLS can give you the finest in pipe protection and still save you time and money.



Pipe Line Service Corporation

FRANKLIN PARK, ILLINOIS

Quality pioneers in coating and wrapping pipe for a quarter century

There's a PLS plant strategically located to serve YOU!

Machining spur gears made from Bethlehem forged-and-rolled blanks.

When the Blank is Sound, Machining Costs Go Down

You probably know a machinist whose specialty is gears. Some day ask him what a sound blank means in terms of machining speed. Ask him how a sound blank reduces costs.

Directly or indirectly, his answers will tell you why Bethlehem gear blanks are so widely specified. Wherever these sturdy Bethlehem products are used, their advantages are instantly apparent. Made in a two-way mill that both forges and rolls the steel, they are highly uniform and very strong throughout. Internal structure is excellent. There are no hidden pitfalls beneath the surface to snag the cutting tool, delay the work, or cause rejects. These circular blanks can be turned, bored, faced, and hobbed with complete assurance of a good finished job in every respect.

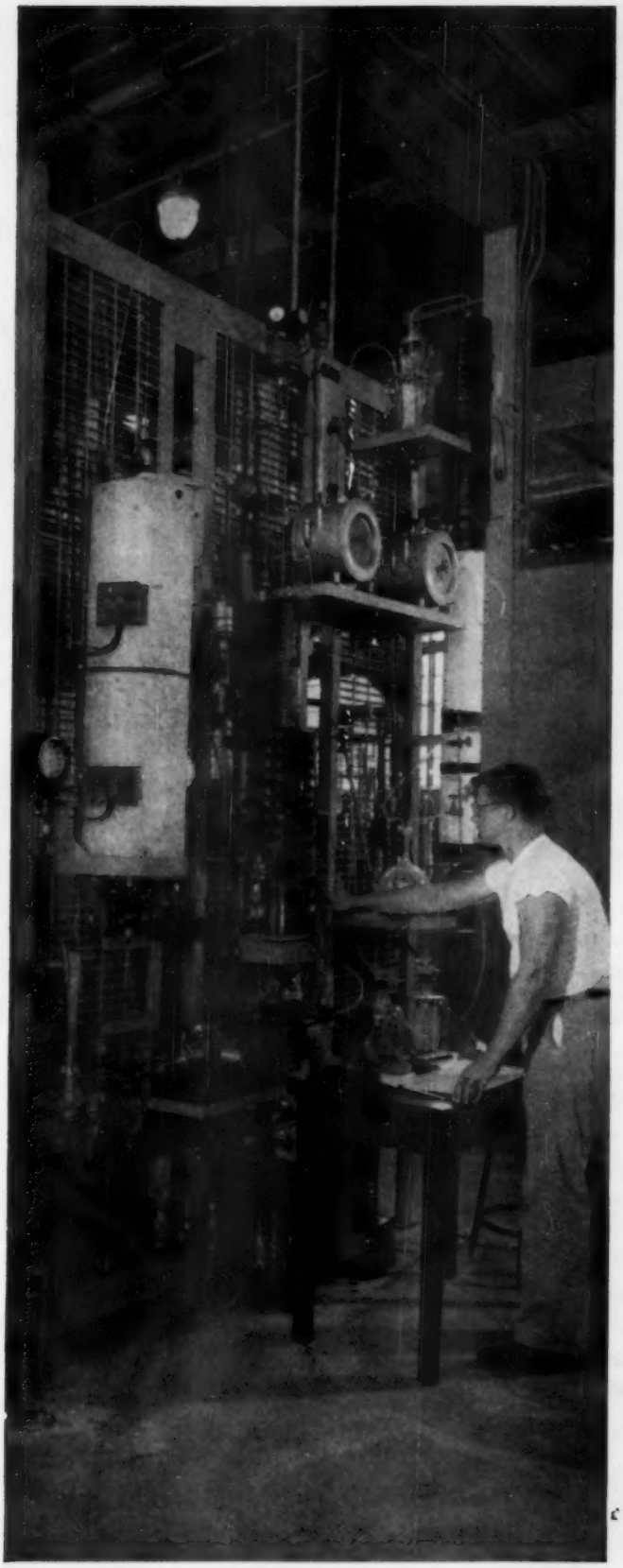
You can obtain Bethlehem forged-and-rolled blanks in sizes from 10 to 46 in. OD, heat-treated or untreated. They are available in a wide range of sections. Use them not only for gears, but for crane and sheave wheels, flywheels, turbine rotors, brake and clutch drums, pipe flanges, etc. Many details are covered in Booklet 216, a copy of which will be mailed at your request.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

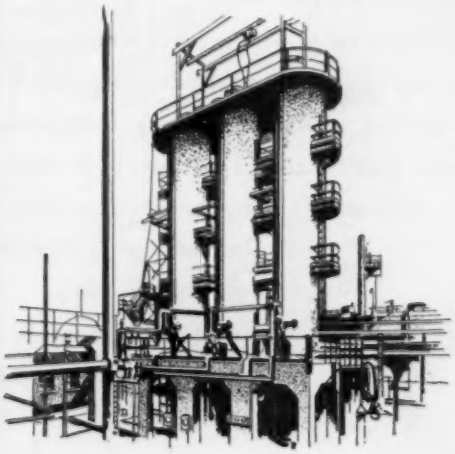


Because we serve so many we can serve all better

UOP has a lot of customers in the petroleum refining and petrochemical fields. Refiners large and small, all over the free world, depend upon us for much of the research and engineering they need to keep products and manufacturing processes in line with the constantly growing demand for more and better things from petroleum. Serving so many customers is a big advantage, not only to us, but also to each customer.

Because of our breadth of operation across the industry we are able to provide the finest research and engineering available in petroleum refining technology, a staff that most refiners would find economically impractical to assemble. Too, in our more than 40 years of experience working with so many refiners we have faced and solved most every type of problem in our field.

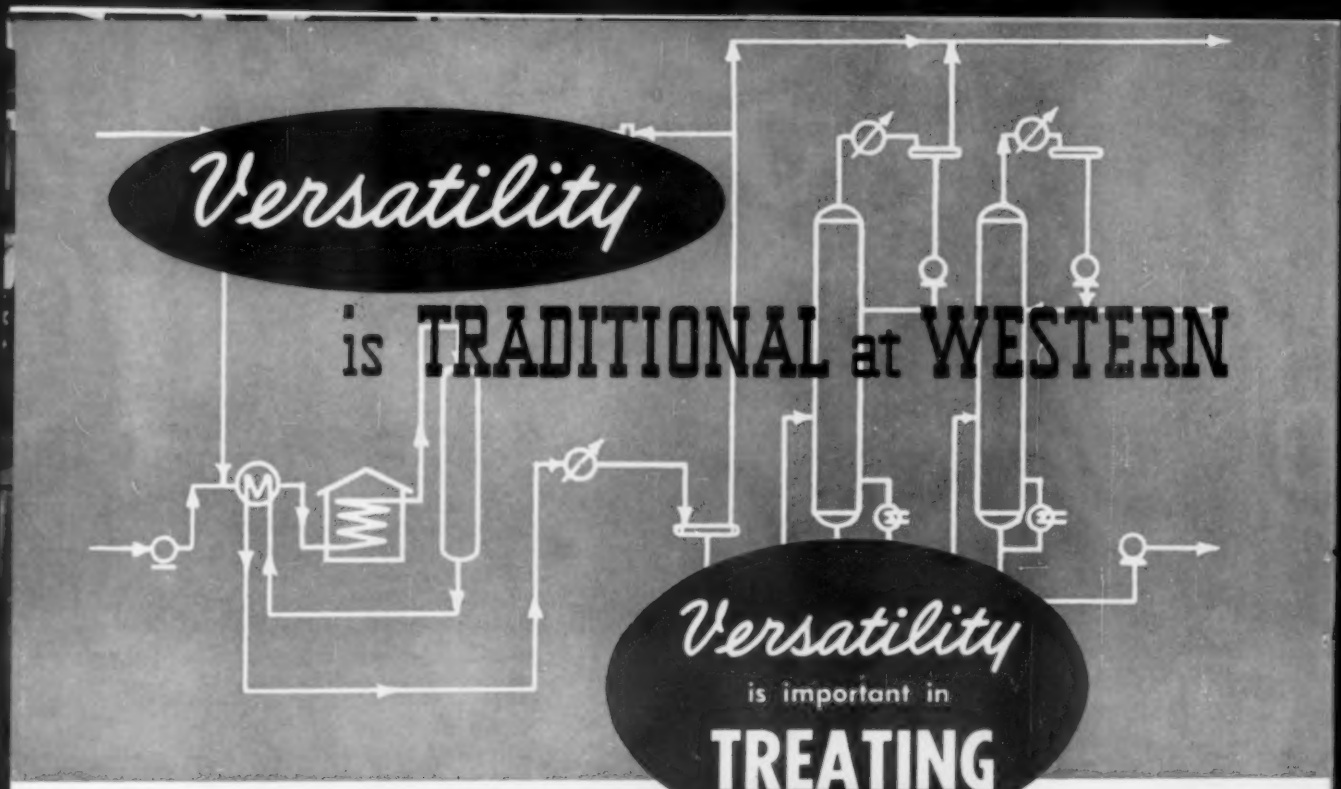
As a result we have been able to develop and make commercially practical many of the most widely used oil refining and petrochemical processes. These are available to all refiners regardless of the size or scope of their operation.



UOP® UNIVERSAL OIL PRODUCTS COMPANY

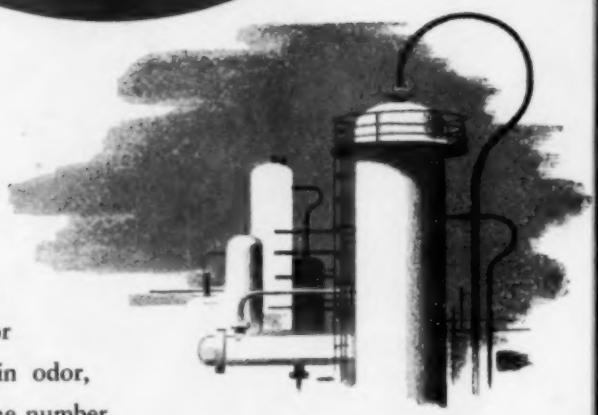
30 Algonquin Road, Des Plaines, Illinois, U. S. A.

More Than Forty Years Of Leadership In Petroleum Refining Technology



Versatility is TRADITIONAL at WESTERN

Versatility is important in TREATING



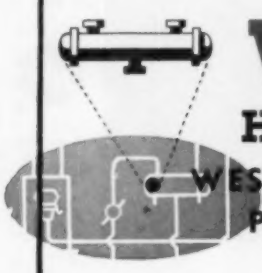
Treating petroleum fractions for the removal of sulphur, nitrogen, oxygen and other contaminants is a versatile hydrogenation process.

With a range of objectives which includes reduction in sulphur and nitrogen compounds—preparation of straight-run or cracked catalytic reforming feedstocks—improvement in odor, color, gum or storage stability, in burning properties, cetane number, lead susceptibility, and susceptibility to catalytic cracking—the equipment used in these process applications must provide an equal range of versatility.

Western Heat Exchangers are closely rated, carefully designed and accurately fabricated to meet the exacting demands of such treating processes—and merit *your* consideration and acceptance.

Western Heat Exchangers are used extensively and satisfactorily in hydrogen treating.

Western's representatives are at your command—**immediately.**



WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

P. O. Box 1888 – Tulsa, Oklahoma

Surface defect led to closer examination
Laminated area curled back
Dark line shows extent of lamination
CUTAWAY SECTION
SIDE VIEW of 6" x 4", Schedule 40, "Question Mark" welding reducer, cut out of line.

Watch out for the after-costs of Question Mark fittings!

Unknown fittings may look like a bargain on the price tag, but watch out for the consequences!

Surface defects led to the above "Question Mark" fitting being cut from the piping. Further examination showed the steel inside was laminated. Pieces cut out literally fell apart. Here was an open invitation to serious trouble . . . lost production, wasted dollars and possible human casualties.

This is another example of a dangerous situation posed by unknown fittings of questionable quality . . . a serious threat to the safety and economy of well-engineered piping.

DANGER! *Your first warning of Question Mark fittings is their lack of complete, permanent identification of manufacturer, wall thickness, weight, material . . . as required by A.S.A. code.*

You can avoid these risks by specifying KNOWN fittings!

A message in the interests of top quality piping
. . . by Tube Turns, Louisville, Kentucky

YOUR SAFEGUARD

Safeguard your piping investment with known fittings!

TOP QUALITY! *Directional and size changes in this process piping are made with TUBE-TURN Welding Elbows and Reducers . . . recognized for their unsurpassed uniformity and quality.*

The cost of fittings is a small fraction of the total cost of a piping system. To buy "cheap" fittings and run the risk of impairing the performance of your entire system can, therefore, be "penny wise and pound foolish."

When you specify and buy TUBE-TURN* products, you know your investment is safeguarded by unsurpassed quality of fittings and flanges. They meet all American Standard and Safety Code requirements. Each product is permanently marked with complete size and material designation.

COMPLETE LINE! *Your nearby Tube Turns' Distributor gives you prompt delivery from the complete line of more than 12,000 Tube Turns' stocked items. Photo courtesy The Ross-Willoughby Co., Columbus, Ohio.*

STANDARD for Butt-Welded Carbon Steel Piping Systems. Covers materials, assembly methods and welding procedures to use for safe, economical and maintenance-free piping. Mail the coupon for your free copy.

TUBE TURNS, Dept. J-9
224 East Broadway, Louisville 1, Kentucky

Please send new Standard for Butt-Welded Carbon Steel Piping Systems.

Company Name _____

Company Address _____

City _____ *Zone* ____ *State* _____

Your Name _____

Position _____

Available from your nearby TUBE TURNS' distributor

*"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

TUBE TURNS

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Chicago • Detroit • Atlanta • New Orleans • Houston • Midland • Dallas • Tulsa • Kansas City • Denver • Los Angeles • San Francisco • Seattle
In Canada: Tube Turns of Canada Ltd., Ridgetown, Ontario • Toronto, Ontario • Edmonton, Alberta • Montreal, Quebec

Why J&L Supply sells CABOT Pumping Units

The demise of the standard rig and the central pumping power was accelerated by the advent of Cabot units. Here was basic improvement — a tremendous difference in price and even a greater difference in efficiency. A new era was at hand.

Cabot improvements have followed year after year, some minor, some sensational as in the case of the patented rubber tail bearing. You can fit ANY well of ANY depth and ANY potential with a Cabot.

Cabot production not only costs you less, but is infinitely more satisfactory. Nothing with moving parts could be more dependable than a Cabot. Yet parts and service are at hand in the United States and Canada 24 hours a day, seven days a week.

Character is more than skin deep — you can't evaluate a Cabot from the next lease. Investigate! Call J&L Supply now.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

J&L – A GREAT NAME IN SUPPLIES

COLD facts about a HOT subject . . .

Stewart Stoves

● Decide right now to replace make-shift heating facilities this winter with clean, safe, dependable Stewart Stoves.

Equipped with regular Stewart Hi-Efficiency B-4 gas burners—"The Burner without an equal" — Stewart Stoves provide plenty of heat at low cost, for derrick floors, warehouses, supply stores, garages, industrial plants, etc.

They are furnished for use with either natural, butane, propane or manufactured gas —furnished with or without vents.

Natural gas stoves furnished with gas valves, pilot light and pressure regulator. Butane stoves do not have pilot light and pressure regulator.

CONSTRUCTION: Bodies are heavy sheet steel. Rounded top, baffle plates and legs are cast iron. Finished with high temperature aluminum paint.

SIZE:

Model 15: 50,000 BTU, 35" high by 19" O.D.
Wt. 100 lbs.

When ordering, specify gas to be used.

U-11-56

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

They Say—

A lobbyist, and proud of it

"I am a lobbyist; a registered, card-carrying lobbyist . . . I registered as a lobbyist to work for the passage of the Harris-O'Hara natural gas bill.

"I am proud to be a lobbyist. The only way in which a republic such as ours can function is for Congress to express the will of the people on the national level. Congress cannot express the will of the peole unless the people express their will to Congress.

"In one of his first messages to Congress, the President, himself, pointed out that it is the duty of every American citizen to present his views to Congress in the light of his own interest, and it then becomes the duty of Congress to resolve any conflicting views in the national interest.

"Lobbyists and other citizens provide Congress and its committees with data that is invaluable. In the complex world of today, Congress could not function without that data.

"Thus when lobbyists and other citizens present their views to Congress, they are discharging one of the most important responsibilities of American citizenship."

Charlton H. Lyons, president, Mid-Continent Oil and Gas Association, in a speech to the Independent Petroleum Association of America.

Allowable system a "tool"?

"The general purpose and intent of a system of restriction of production to market demand is wholesome and in the interests of conservation. Our system has, however, become a 'tool' for importers of foreign production. They are using it as a sledge hammer on the heads of our weakening domestic producers . . .

"The restriction of domestic allowables to make way for foreign crude may be a . . . confiscation by the state of the domestic producers' market demand for the benefit of foreign crude producers without compensation therefor.

"Our highest court has held that for a waste order to be valid 'it must be nonconfiscatory.' Moreover, when our state regulatory agencies deny to producers an opportunity at least equal to that afforded foreign producers, the effect is a discrimination by the states against domestic producers in favor of foreign producers.

"Our allowables, as presently deter-

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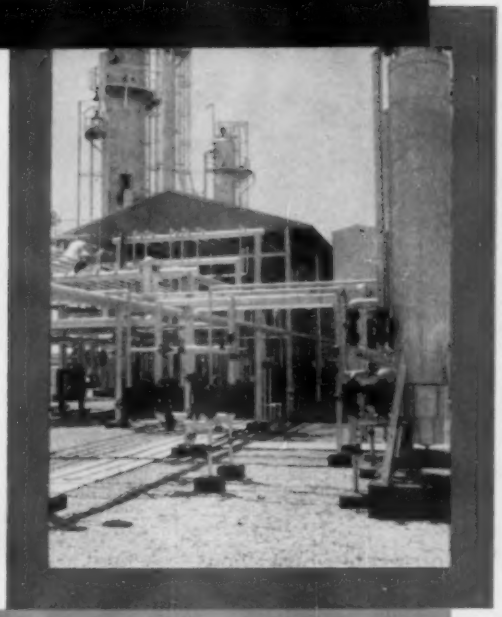
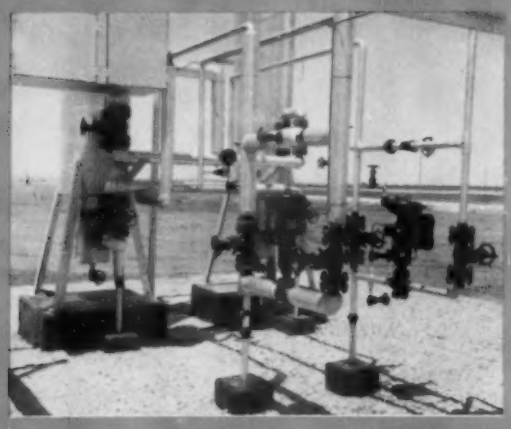
forged steel asa class valves in your process area from formation to finished product



Right foreground, propane dehydrators. In background, plant process pump area.



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advantages

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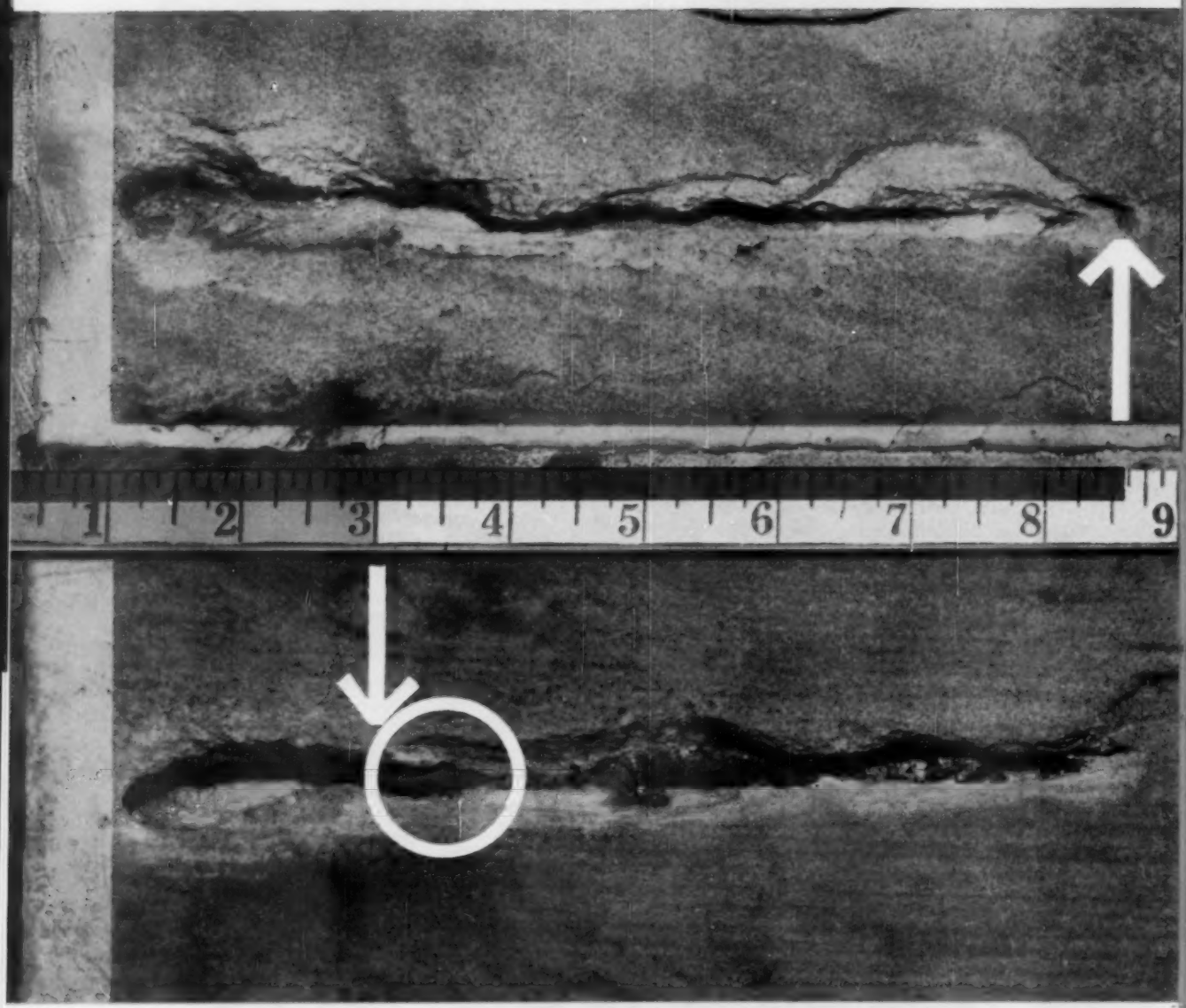
HERE'S HOW THE NEW SCHLUMBERGER BIMETALLIC LINER* ELIMINATES



Cutaway targets of Berea sandstone into which 4" shaped charges were fired. Upper photo shows the results of the Bimetallic liner charge. Lower photo shows results of the conventional copper-liner charge. (Note large slug.) The obvious difference is that a slug is left by the copper-liner. The formation can produce, in the first target, through the full perforation of the Bimetallic charge. With the second target, the flow is limited to three inches of clean hole where the copper slug has blocked the perforation.

For free-flow perforations, use the Schlumberger No-Plug Bimetallic charge

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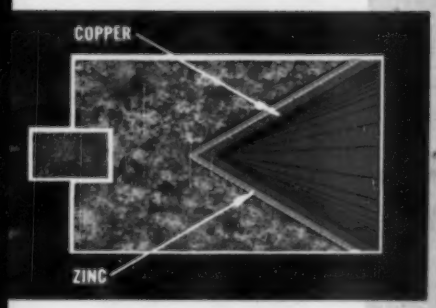
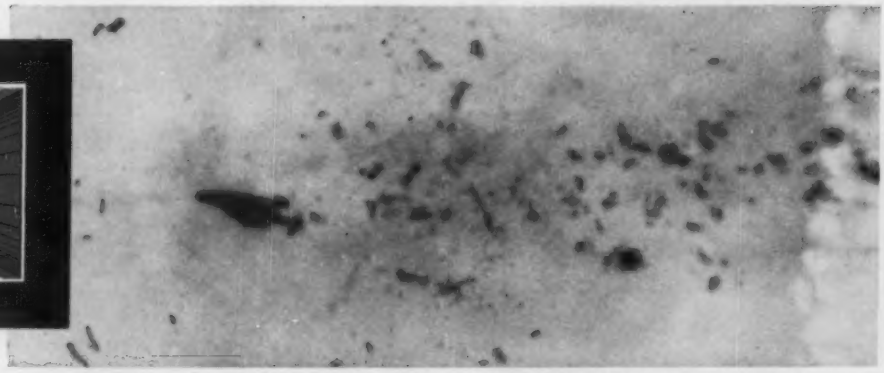
S PLUGGED PERFORATIONS

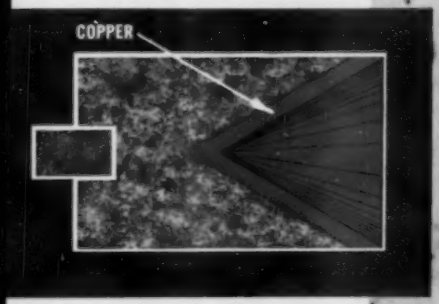


Cutaway of shaped charge incorporating Bimetallic (zinc and copper) cone liner.

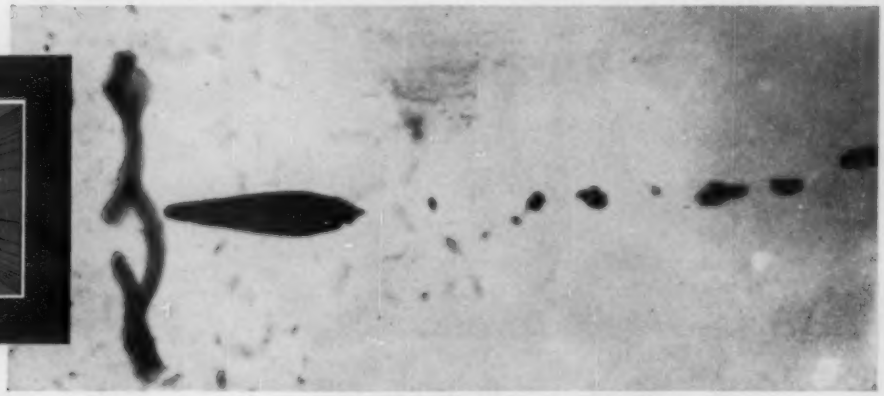


Flash radiograph of detonated Bimetallic charge. The outer portion of the liner, which ordinarily produces the copper slug, has been replaced by zinc which volatilizes.

Cutaway of shaped charge incorporating conventional copper liner.



Flash radiograph of detonated conventional charge with copper liner. (Note large size of slug.)



Since the advent of Schlumberger's flow laboratory, increased attention has been focused on new designs of shaped charges as applied to oil well completions. The fact that a real problem has existed in shaped-charge perforating cannot be denied. The problem has resulted from frequent plugging or blocking of the perforation by a "slug" or "carrot" inherently characteristic of the shaped charge.

Now, Schlumberger has developed a Bimetallic liner in which the formation of the slug is effectively eliminated in the jet process.

Tests, made under realistic conditions, prove that the slug-free perforations result in improved flow characteristics. Performance and efficiency of the individual perforations are greatly enhanced when the Bimetallic liner is used; while maintaining perforation and hole-size characteristics of the conventional copper liner.

Write for complete and detailed information on the Bimetallic liner, another great contribution in perforating from Schlumberger—the first and only service company with a perforating-flow laboratory.

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mined by our regulatory agencies, may be subjected to legal attack on these grounds."

Elton M. Hyder, Jr., attorney for independents fighting pipeline connections in Texas, in a speech to the West Central Texas Oil and Gas Association.

Efficiency and inflation

"As businessmen, we are part of a system dedicated to seeking ways to greater efficiency. Indeed, this is the whole justification of competitive capitalism. Today, as members of the American business system, we have the very real obligation to demonstrate our ability to give customers what they need at prices they can afford.

"This is so because everywhere, including the United States, there is growing concern about the dangers of inflation . . . Although it is not the responsibility of the businessman alone to control inflation, he can make a significant contribution to this important end by increasing his efficiency . . .

"Last year in the State of Texas, for example, 13,082 oil wells were completed. Had we doubled our well spacing, we might have reduced expenditures by some $360,000,000 and saved an additional $10,000,000 per year in operating costs. This total saving would have been equivalent to 35 cents for each barrel of crude oil produced in Texas last year.

"Or, putting it another way, this saving in Texas alone would have brought about a 5 per cent reduction in the entire U. S. industry's cash expenditures. We should also consider that the drilling of many of these 13,000 wells in Texas did not go to increase our production, but rather resulted in further prorating the production from wells already drilled."

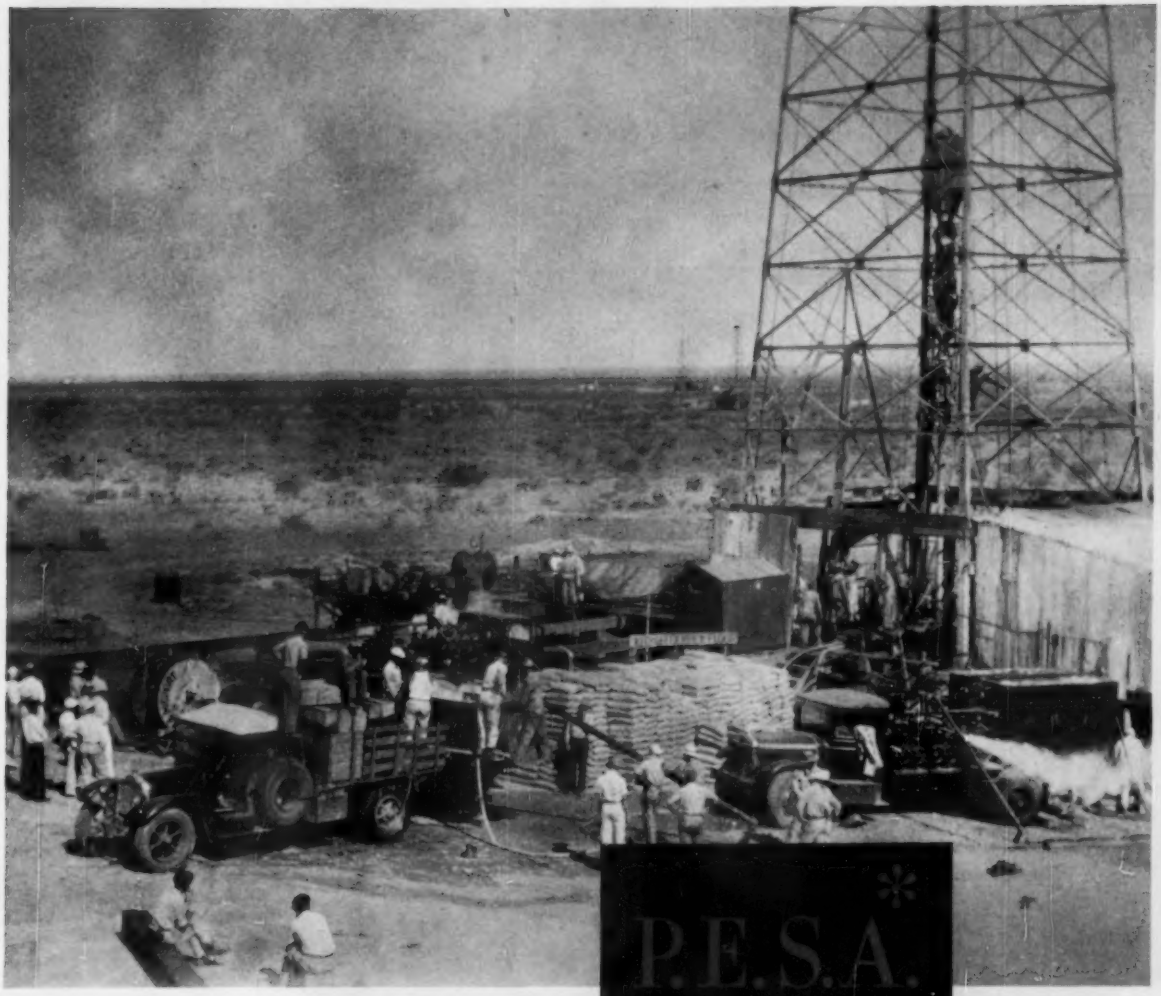
M. J. Rathbone, president, Standard Oil Co. (N.J.), in a speech to the Independent Petroleum Association of America.

API citation to W. K. Lewis

"Your life has been rich in service —to education, to science, to industry, to Government. By the brilliance of your perceptions you have illumined areas of technology hitherto dark to us, even as you have sought, by your wit, humor, and humanity, to remind us that we do not live by technology alone.

"As a teacher you are held in affectionate awe by two generations of students, whom it was your constant

Deepest test in the world - 1935 model!



The McElroy Number 103 of Upton County, Texas was started in 1933 and completed in 1935 by a major oil company. It set new records for cost, time to complete, and weight of casing string.

This test was the deepest, (12,786 feet), the most expensive (over $1,000,000) and had the heaviest string of casing (10,301 feet of 7⅝") ever used. It took longer to drill, (over two years) and used more bits (965) than any other well. *Moreover, no important producing formations were discovered.*

This is an excellent example of the kind of BIG pioneering you operators have done. It's a big reason why the oil industry is one of the most progressive in the world.

As a result of this experiment, we—the manufacturers, supply and service companies that now make up PESA—applied the lessons you learned and helped you develop better bits, better mud control practices and stronger tubular goods. Cooperation like this makes the oil industry strong.

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endeavor to make both knowledgeable and self reliant. Many of the present leaders of the petroleum and chemical industries once wrestled with formulae at your blackboard—a hard proving ground that helped ready them for the more difficult ones ahead. Their achievements stem in good part from the wise guidance and inspiration you gave them.

"As a valued advisor to industry and to Government, you have contributed immeasurably to the nation's industrial progress and to our national defense. And yours is the distinction of having done more than any other one man for the development of the science of chemical engineering—as it is taught and as it is practiced today.

"The petroleum industry is particularly indebted to you for your pioneering in the development of one of the most important of modern chemical processing techniques — fluidization, which has revolutionized refinery practice throughout the world."

Text of the scroll honoring Dr. Warren Kendall Lewis, professor emeritus of chemical engineering at Massachusetts Institute of Technology, who received the American Petroleum Institute's Gold Medal for Distinguished Achievement at the API annual meeting.

Is oil on way out as fuel?

"As nuclear energy becomes increasingly important, the use of fossil fuels—coal, oil, and gas—will necessarily decrease in relative importance.

"Petroleum and coal eventually will become too valuable to use for fuel. They will be uniquely important for industrial use as the source of a host of valuable chemical raw materials."

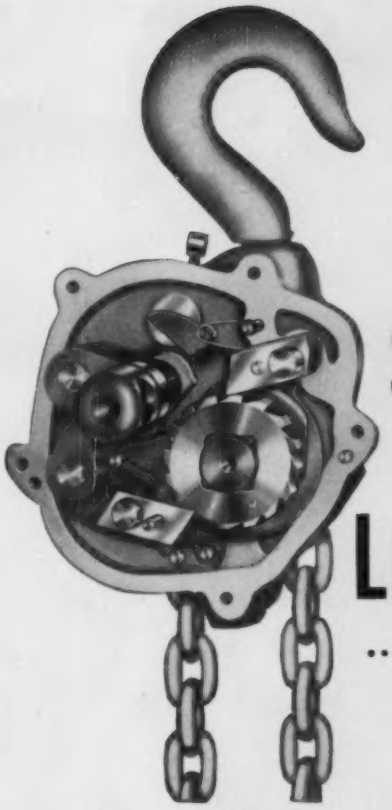
Dr. C. C. Furnas, chancellor, University of Buffalo, in a speech to the Southwest Research Institute's Conference on the Southwest in the Next Decade.

Small car demand in U.S.

"If we were to mass-produce cars of the European type in this country, their total purchase and operational costs would probably amount to 60 or 65 per cent of our figures, but while the small imported car has shown us how to get more performance with less horsepower, and how greatly to improve roadability, its appeal is still comparatively limited.

"It would probably take a serious depression to get the American public to weigh the economy of smaller cars."

Reginald J. Pigott, formerly di-



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Super Power hoists are shipped from the factory with sealed-in, permanent lubrication for the moving parts. This lifetime lubrication is possible because of the exclusive ratchet-and-pawl construction. Since hoists are constantly lubricated, service life is increased considerably and maintenance reduced.

Coffing Super Power hoists are available in 1½ and 3-ton capacities in aluminum, and in capacities from 1¼ to 5 tons in malleable iron. New compound levers reduce size and weight and enable them to lift loads with less handle pull than any hoists in their class. Super Powers are the lightest hoists in their capacity range. Overload testing, "Safety Valve" handles and the constant load-locking ratchet and pawl assure safe operation. For complete details on these hoists, consult your supply store, or write to us for Bulletin L-3.

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- Drop-forged hook of heat-treated alloy steel
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- Narrow throat
- Safety point on hook
- Hook design prevents injury to wire rope
- Hook will not distort at breaking strength of rope

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rector of engineering, Gulf Research & Development Co., in an article in the Autumn issue of American Petroleum Institute Quarterly.

CALENDAR OF EVENTS

NOVEMBER

26-28 New Mexico Oil and Gas Association, annual meeting, La Fonda Hotel, Santa Fe.

DECEMBER

1-3 Interstate Oil Compact Commission, annual meeting, Tulsa.

1-3 Kansas Independent Oil and Gas Association, twentieth annual meeting and oil show, Broadview Hotel, Wichita, Kans.

1-6 American Society of Mechanical Engineers, annual meeting, Statler Hotel, New York.

2-6 Twenty-sixth Exposition of Chemical Industries, Coliseum, New York.

8-11 American Institute of Chemical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

10-11 University of Oklahoma, second annual conference on water quality control for subsurface injection, sponsored by the School of Petroleum Engineering, Extension Study Center, Norman, Okla.

JANUARY

11-12 National Oil Scouts and Landmen's Association, directors' meeting, Adolphus Hotel, Dallas.

16-18 Association of Oilwell Servicing Contractors, second annual convention, Baker Hotel, Dallas.

19-22 Pipe Line Contractors Association, tenth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

FEBRUARY

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting. Deshler Hilton Hotel, Columbus, Ohio.

10-13 American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, forty-third annual meeting, Biltmore Hotel, Los Angeles.

12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

17-21 International Atomic Exposition, Inc., 1958 Nuclear Congress, Chicago Amphitheatre, Chicago.

20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipeline conference, Jung Hotel, New Orleans.

APRIL

1-3 University of Oklahoma, fifth annual conference on corrosion control, Extension Study Center, Norman, Okla.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division; Canada-U.S. chemical engineering conference, Montreal.

21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

27-29 Independent Petroleum Association of America, midyear meeting, Hotel Sherman, Chicago.

27-30 American Association of Petroleum Geologists, Rocky Mountain section, Casper, Wyo.

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.

MAY

5-6 Society of Petroleum Engineers of A.I.M.E., North Texas section, secondary-recovery symposium, Wichita Falls, Tex.

5-7 Purdue University, thirteenth annual industrial waste conference, Purdue Memorial Union Building, Lafayette, Ind.

12-16 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, Los Angeles.

21-23 American Petroleum Institute, Division of Marketing, midyear meeting, Roosevelt Hotel, New Orleans.

22-23 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

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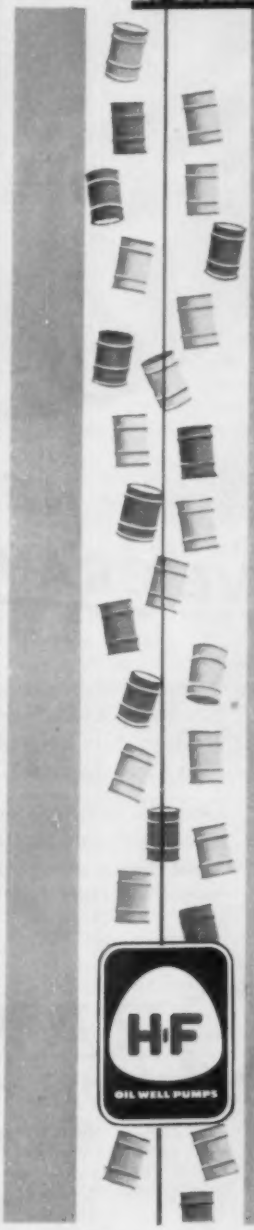

This special insert pump has two applications: (1) To lift a greater volume of fluid in order to increase the daily oil production, and (2) To produce the same volume of fluid, but at a slower pumping rate.

The Double-Displacement Rod Pump is a traveling barrel, bottom hold-down assembly with two plungers and two barrel tubes which work simultaneously with a single set of valves. It seats in a standard cup-type seating nipple or the old working barrel made up in the tubing.

Double-Displacement Rod Pumps will handle more volume than tubing pumps of corresponding size, and have the added operating advantages of an insert-type pump which can be run and pulled on the rods.

When a conventional rod pump will no longer produce sufficient fluid to make the oil allowable, instead of installing a tubing pump many operators run a Double-Displacement pump. In addition to the larger capacity over any size tubing pump they could run, their savings on a pulling job usually more than pay out the Double-Displacement pump. Another application is where daily gross fluid rates are limited by short-stroke equipment. Instead of replacing such wells with expensive, larger units, a Double-Displacement Rod Pump can be run in which will handle the required daily fluid volume with the same surface equipment.

Double-Displacement pumps are in successful operation in fields throughout the Mid-Continent area, including many water-flood projects. You are welcomed to obtain illustrated literature and comparative field test data on Double-Displacement Pumps through your store, from one of the field representatives we have in all principal areas, or by writing to us in Fort Worth. There is no obligation, of course.

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING

Economic Analysis

WELL SIR, we went up to the API in Chicago to try to get a line on how the oil business is going to be next year. We're still a bit confused.

There were several high-powered economists on the program, and we listened very carefully to their analyses of the economic situation. It was very enlightening.

It seems that we are now in a static phase of a dynamic economy. That is to say, certain upward forces are temporarily dormant pending necessary readjustments. Closed for repairs, so to speak, but watch for the grand reopening. Others are still doing business during alterations, and please pardon the inconvenience.

The elements of gross national product are moving in diverse trends with indeterminate and speculative factors influencing their ultimate cumulative impact.

Certain types of spending will decrease, but others will increase. The public still has a high disposable income but at the same time it is trying to get out of debt. The rediscount rate will be altered but this will not be immediately reflected in the production index.

There were a lot more similarly cogent and penetrating observations about the health of the body politic, and we drew the very definite conclusion that if things don't get worse fast they will get better slowly.

Then we heard a forecast of the oil business and learned that while the economists can very accurately plot the percentage increase in demand for petroleum products on semilog graph paper, no operating oil man has ever been able to guess how many barrels will be consumed in a given year.

As for the immediate future, the percentage increase in oil demand is not increasing as fast as previous increases but because of the constantly augmented base the volumetric increase is relatively higher than is indicated by the declining increase in percentage points.

And since oil men sell barrels rather than percentage points they have nothing to worry about because the extrapolations on the charts indicate a high level of energy requirements in 1967.

We were feeling pretty good about all this until the next morning when we read the papers and learned that the infernal revenue men are going to crack down on expense accounts in a big way.

Here is a new economic factor of major proportions, one which the API speakers either hadn't heard about or else mercifully ignored. If Uncle Whiskers goes through with this threat it will bring on an economic tailspin of incalculable ramifications.

Talk about a tight-money policy! The Federal Reserve Board's manipulations of the rediscount rate will be an insignificant factor beside the Treasury's t i g h t expense-account policy.

Our own economic analysis is that business has been good for the past several years because we have been riding along comfortably in what should be described as an expense-account economy. People haven't been spending their own dough; they've been putting everything on the expense account.

Now if the Government outlaws expense accounts (or makes people justify them, which will amount to the same thing in practical effect) the props will be knocked out from under the whole shooting match. Taxi companies, airlines, and a raft of other businesses will fold up immediately, and there goes the gasoline market.

The consequences of that sort of tight-money policy are too horrible to contemplate. It just can't happen. The human suffering and the public outcry will be so great that the revenooers will have to relent to save the nation from utter disaster.

So here's our personal business forecast: Forget about gross national product, BLS indexes, the rediscount rate, and all classical indicators of economic conditions. The major factor today is the tax boys. If they stay tough with expense accounts, business will be paralyzed. If and when they let us get back on an expense-account economy, everything will be velvet again.

—Henry D. Ralph.

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Ask any Baker representative or office for Catalog Supplement #301, or arrange for Baker DIFFERENTIAL FILL-UP Equipment at your supply store.—**BAKER OIL TOOLS, INC.,** Houston, Los Angeles, New York.

BAKER
DIFFERENTIAL
FILL-UP
EQUIPMENT

Oil's public affairs need this approach

THE decision of the API directors to create a department of public affairs is wise, though tardy. It is belated recognition that the oil industry is inextricably mixed in the affairs of the public.

But the initial consolidation of the American Petroleum Industries Committee and the Oil Information Committee will present some problems. It could be a stormy marriage, this wedding of the bar with Madison Avenue.

And when that is consummated it will be only a start toward setting the industry's public affairs in order.

IT MUST BE A TWO-WAY STREET, this new department of public affairs. It must interpret the public to the oil industry as well as interpret the oil industry to the public.

Heretofore the industry has been dishing out what it thought ought to interest—and satisfy—the public. Obviously it guessed wrong, as witness the prevalence of misunderstandings and accusations.

APIC, largely influenced by legal philosophy, has dealt with legislative matters in the manner of lawyers—quietly, cautiously, and ponderously. Its main concern has been taxes, particularly that lost cause, opposition to the gasoline tax.

OIC, largely influenced by advertising philosophy, has dealt with public relations in the manner of advertising men—noisily, glamorously, and superficially. Its main concern has been the romance of the industry and the importance of oil.

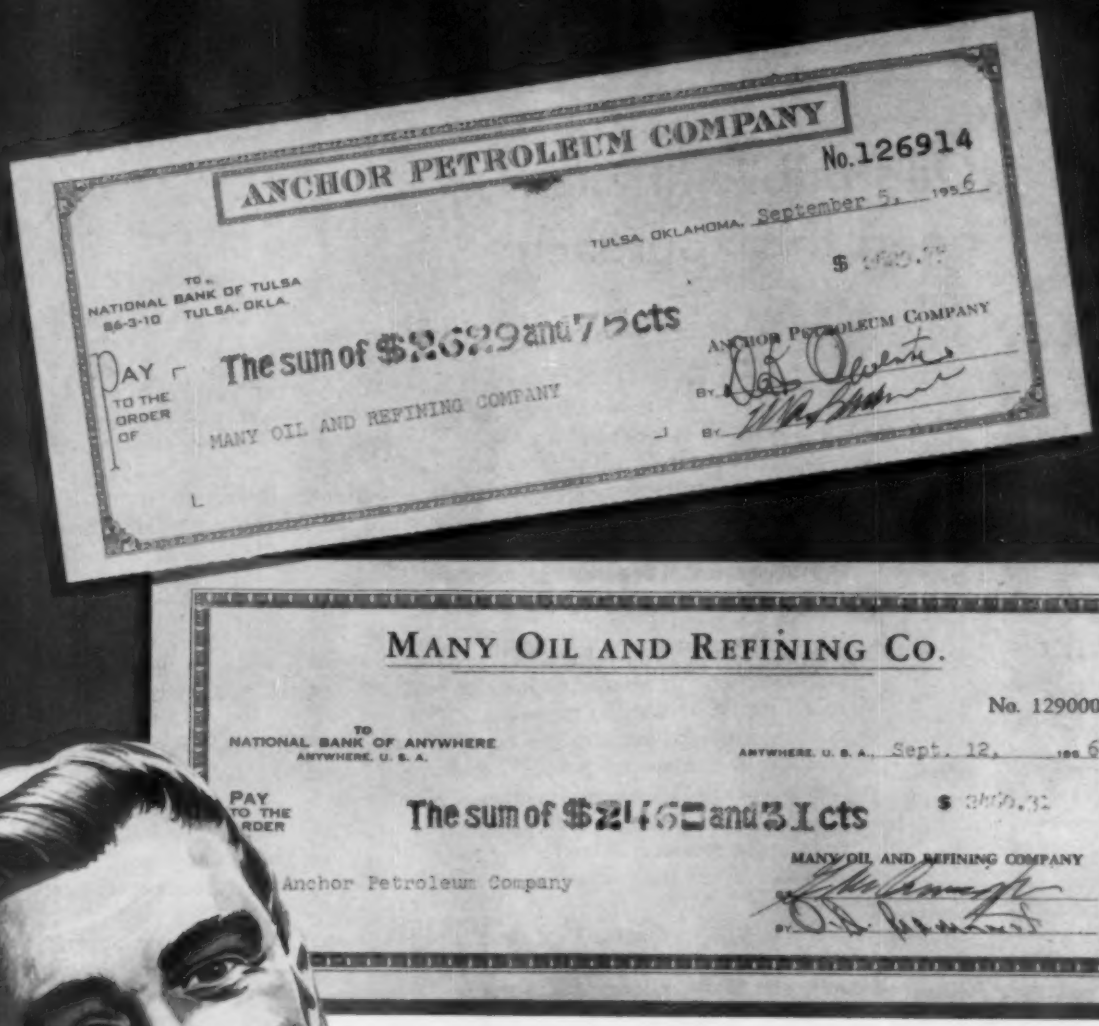
Neither legislative spadework nor generalized ballyhoo encompasses the broad subject of public affairs. Nor will a combination of them—if they can be combined without radical changes in both.

Because of the jurisdictional division between these two API groups, OIC has kept aloof from specific problems and local trouble spots. Its long-range program of building good will has much merit, but it left a big void in the field of political action which the APIC work did not begin to fill.

SOMETHING NEW MUST BE ADDED to fill this void—several things, in fact. The industry must be alerted to anticipate trouble in its public affairs, not just on legislative calendars but in general public sentiment.

More economic and political research is needed to lay a sound foundation for programs of publicity and of action. The right kind of office should be established in Washington, the world center of news dissemination and opinion formation.

And most important, every big shot and little shot in the industry must take a personal hand in keeping oil's public affairs in order.


ANCHOR PETROLEUM COMPANY
No. 126914
TULSA, OKLAHOMA, September 5, 1956
TO
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56-3-10 TULSA, OKLA.
PAY TO THE ORDER OF
The sum of $2699 and 75 cts
MANY OIL AND REFINING COMPANY
ANCHOR PETROLEUM COMPANY
MANY OIL AND REFINING CO.
No. 129000
TO
NATIONAL BANK OF ANYWHERE
ANYWHERE, U. S. A.
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PAY TO THE ORDER
The sum of $2146 and 31 cts
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the OIL AND GAS JOURNAL

November 25, 1957

Petrochemicals Will Double by 1965

Say the experts:

1. Petroleum's shares of total chemical output will rise from 26 to 40 per cent.

2. Crude-oil needs will reach 99 million barrels a year—equal to 2.3 per cent of refinery runs to stills.

3. Aromatics demand will swing sharply upward, and more will be made from oil.

4. Ethylene output will jump from 3.6 billion to 6.5 billion pounds a year.

5. Propylene output may hit 2 billion pounds by invading the plastics field.

6. There's a tough side: raw-material costs will rise as petrochem producers compete with refiners for charge stocks.

THESE ARE the conclusions of a panel of experts who voiced their predictions for the booming petrochemical industry last week in Houston.

The panelists addressed a joint meeting of the Chemical Market Research Association and the Commercial Chemical Development Association.

Most of the new capacity to be added, they agreed, will be built along the Gulf Coast, which already claims about 80 per cent of today's capacity.

Here's how some of the participants size up the petrochemical industry of 1965:

WAYNE E. KUHN, general manager, research and technical department, Beacon Laboratories, The Texas Co.:

The petrochemical industry has been based primarily on byproduct raw materials from the petroleum industry. But with rapid strides in petroleum technology, there is now competition with petroleum refining for raw materials.

Petrochemical output is growing at a much faster rate than refined products and consequently will require a slightly bigger slice of the crude.

Total crude to stills should increase from 2.94 billion barrels this year to 4.27 billion in 1965 for a 45 per cent gain. But petrochemical production should gain by more than 100 per cent.

These figures illustrate the growth of petrochemicals:

	Billion lbs./yr.	% of total chemicals
1930	0.14	1
1955	32	24
1957 (est.)	38	26
1962 (est.)	62	31
1965 (est.)	85	40

And here are the figures showing the past and estimated future crude-oil requirements of the petrochemical industry (in millions of barrels):

Year	Crude to stills	Crude to petroch.	% to petroch.
1930	915	0.18	0.02
1955	2,590	35.5	1.35
1957	2,940	42.6	1.45
1962	3,690	72.0	1.95
1965	4,270	98.8	2.3

While the basic raw material—crude oil—will be available, the petrochemical industry will be competing actively for components which are useful for blending into premium motor fuel. More and more, the production of higher-octane fuels is becoming a series of chemical processes or treatments. Unless petrochemicals offer a better economic outlet for the refiner, he will prefer to convert byproducts to fuel, his primary business.

Catalytic cracking will increase, and with this increase will come a much greater volume of light hydrocarbons, notably the olefins—ethylene propylene, butylenes, and pentylenes. Competition for these materials, however, will be keen because many will be required in other refining operations.

For example, alkylation is in direct competition with petrochemicals because it requires large quantities of olefins in the C_3 through C_5 boiling range. It also requires large quantities of isobutane.

Must offer more . . . Polymerization also is a factor in propylene and butylene consumption, although the process is employed primarily as a balancing operation for the olefins.

It does provide a convenient process for making high-octane blending gasolines but, more important for the petrochemical man, it sets a minimum value for the olefins. In order to compete, the petrochemical industry must offer a price which is greater than their value as polymerization charge.

This internal competition within the oil industry will produce rising costs for the petrochemical manufacturer. And there will be other cost increases. Natural gas has been on the rise, and, in the final analysis, crude

prices are bound to increase. All this means higher basic raw-material costs in the years to come.

A word of caution. World conditions are changing and will have a sharp effect on demand for domestically manufactured petrochemicals. Foreign areas are developing their own industries—in many instances sponsored by venture capital from the U.S. This means export markets will not grow as fast as before and, in some case, will shrink or disappear.

L. Karvelas and R. F. Pennig, technical service department, Humble Oil & Refining Co., Baytown:

The growth of hydrogen and aromatics production will be closely allied with the remarkable increase in catalytic reforming. Reforming capacity has increased 400 per cent in the past 4 years.

Although this rate naturally will taper off, reformer capacity for the United States will reach 2.5 million barrels per stream day by 1965. Of this amount, 1 million will be located in the Gulf Coast. Each barrel of reformer feed produces, on the average, 500 cu. ft. of hydrogen. On this basis, the total reformer hydrogen available in 1965 will be 433 million cubic feet in the Gulf Coast area alone.

Several factors govern aromatics production. There will be serious competition for the petrochemical industry because of the demand for aromatics to improve gasoline octane number and mileage. Thus the availability of aromatics will depend on the outcome of an economic battle between chemical and fuel manufacturers for reformer output.

The benzene picture . . . The most important aromatic is benzene. Styrene, the major consumer of benzene, uses 40 per cent of the total domestic demand.

Because of the growth trends for polystyrene and styrene-based synthetic rubber, a conservative estimate of domestic demand is 1.5 billion pounds of styrene per year by 1965.

This output of styrene will require about 186 million gallons of benzene. Ethylbenzene will supply perhaps 20 million gallons of the total.

Benzene also has other uses. In 1965, 92 million gallons will be needed for phenol, 60 million for cyclohexane to make nylon, and 43 million for dodecylbenzene to make synthetic soaps. Total U. S. demand should be at least 500 million gallons per year by 1965.

Of this amount, a minimum of 280 million gallons must be supplied from petroleum sources and 220 million from coal.

Benzene production for 1958 is estimated at 210 million gallons, an increase of 85 per cent over 1956. Seventy per cent of the capacity will be located in the Gulf Coast area.

Toluene demand will expand primarily because of its use in aviation gasoline and chemical synthesis. Consumption should reach 335 million gallons per year in 1965. Coal will supply only 50 million gallons and petroleum the rest.

Domestic C_8 aromatics production should rise sharply from 105 million gallons in 1955 to 300 million in 1965. Coal will supply only 20 million in 1965. Major uses for C_8 aromatics have been for solvents and gasoline.

Hydrogen outlook . . . Hydrogen will be used primarily for hydrogenation of refinery streams. While the high rate of growth in hydrogenation units cannot be maintained, capacity in 1965 nevertheless will reach 4.4 million barrels per calendar day compared with 713,000 bbl. early this year.

The second major use of reformer hydrogen will be in ammonia plants. The growth depends, however, on developing additional market demand above the seasonal fertilizer demand.

H. A. MITCHELL, manufacturing operations group, Shell Chemical Co., New York:

The future of propylene as a petrochemical raw material depends largely on its success in the polyolefin field.

The question is whether polypropylene, by moving into the rugged plastics competition, is superior to polyethylene and similar products.

Isopropyl alcohol now uses most of the propylene consumed in petrochemicals—slightly more than 1 billion pounds in 1956. Propylene served as basic raw material for roughly 85 per cent of acetone production of 607 million pounds last year.

In 1956 petrochemicals used 1.5 billion pounds of propylene, the equivalent of 8.3 million barrels.

KENDALL GREENE, director of commercial research, petrochemicals department, Gulf Oil Corp., Pittsburgh:

The Gulf Coast area of Texas-Louisiana consumed about 2.2 billion pounds of ethylene in 1956. The area should take about 3.6 billion in 1965, well over half the nation's requirements.

Ethylene oxide, ethyl alcohol, polyethylene, halogenated ethylene, and styrene currently account for 95 per cent of total ethylene consumption. All of these should show significant growth in the years ahead. Polyethylene probably will be the leader by requiring about 170 per cent more ethylene in 1965 than it did last year. Requirements of ethylene oxide and styrene should rise by 75 per cent.

The Gulf Coast by 1960 will manufacture slightly less than half its ethylene from natural-gas liquid components, including ethane, and the same percentage from refinery gases. About 5 per cent will come from other sources.

Propane and butane, as feed stock, should account for about 56 per cent of total ethylene produced in the Gulf Coast in 1960.

If it is assumed that the 1960 pattern will apply in 1965, the estimated Gulf Coast ethylene demand will require about 110,000 bbl. per day of hydrocarbon raw materials. About 67,000 bbl. of this would be propane-butane, about 38,000 ethane-ethylene, and the remainder higher boiling feed stocks such as naphtha, residual oil, and the like.

JAMES G. PARK, vice president, Enjay Co., Inc., New York:

Manufacture of rubber polymers in 1965 will break down like this in the U. S.: GRS, 1,007,000 long tons; butyl, 165,000; neoprene, 125,000; nitrile, 40,000; and natural, 600,000.

Existing facilities in the U. S. will be sufficient to meet the synthetic requirements except for butyl, which would have to expand capacity from 147,500 to 165,000 long tons.

There will be a world-wide shortage of polymers by 1965, even with excess capacity in the U. S. Thus the Gulf Coast will, with improvement in transportation, serve more of the world market.

Rubber will play an important role in this development. The world demand for natural rubber in 1965 will be 2.2 million tons, or 300,000 above capacity. This gap must be closed with one of the polymers now in production or in the development stage. Promising replacements for natural rubber include butyl rubber, polyisoprene, and polyurethane.

Raw materials required to meet world requirements for rubber polymers in 1965 include: butadiene, 1,294,000 long tons, styrene 570,000, butylene 225,000, isoprene 7,000, acetylene 95,000 (short tons), and acrylonitrile 14,000 (short tons).

The requirements for only the United States include: butadiene, 730,000 long tons, styrene 300,210, isobutylene 165,000, isoprene 4,950, acetylene 95,000 (short tons), and acrylonitrile 12,000 (short tons).

Gas Off Texas Moves

. . . to market for first time. It's gathered from Chevron field (see map) by Standard of Texas for Texas Eastern

THE FIRST natural-gas gathering system off the coast of Texas went into operation last week.

Sale of gas from Chevron field off Padre Island makes Standard Oil Co. of Texas the first commercial producer of gas in the Texas offshore area. The company already claimed title as the first oil producer in open waters of the Texas tidelands.

Gas from 15 wells in Chevron field is going into the Texas Eastern Transmission Corp. pipeline system. Texas Eastern actually started taking gas from Chevron field several weeks ago, but until last week production was coming only from five wells drilled directionally from shore.

A 6-in., 3½-mile gathering system, recently laid by Brown & Root, Inc., connects the field's five production platforms. Gas then is moved about 1½ miles from a central platform to shore through a 10-in. line formerly used to transport crude oil.

The contract . . . Texas Eastern has contracted to buy up to 45 million cubic feet of gas daily from the offshore field. Stanotex plans to produce immediately about 40 million cubic feet per day, of which 17 million will be from shore-based wells bottomed under the Gulf of Mexico.

The 20-year contract sets an initial price of 14.2 cents per M.c.f. Periodic price increases will take effect in future years.

Chevron field gas is piped to a new $500,000 processing plant recently completed by Stanotex on Padre Island. The plant separates gas from the condensate, which is moved to the mainland by truck.

Several other companies have small gas fields off the coast of Texas. Gulf Oil Corp. has a gas field off the mouth of Aransas Pass, and Shell Oil Co. discovered gas up the coast toward Galveston Bay. Both Continental Oil Co. and Sinclair Oil & Gas Co. have oil and gas off High Island. But none of these fields in the open gulf is producing gas commercially.

Paying off . . . By comparison with some of the discoveries off Louisiana, Chevron field looks rather insignificant. But, economically, the field is much better than most of those in the gulf.

Standard of Texas spent nearly $8,000,000 in offshore operations before producing its first barrel of tidelands oil. By the end of 1956 the company had spent an estimated $11,500,000 on Chevron field alone.

From 1954, when the field was discovered, to October 1 of this year Chevron had produced a little over 33,000 bbl. of oil. But now, with development completed, the combined output of the field's nine oil wells has increased to about 1,100 bbl. daily. Crude is piped to Padre Island through a duplicate system of 3 and 6-in. lines.

Gas production, suddenly becoming an important factor, is expected to triple the income from the field. Stanotex officials now estimate that the field will pay out in less than 4 years.

A market for Chevron field gas has made the difference between a marginal operation and a potential money maker. Without careful planning and bold expenditures by Standard of Texas, though, the field might have remained on the wrong side of the ledger for many years.

The field . . . Chevron field covers more than 4,000 acres, excluding a 640-acre lease on the south flank which still doesn't look promising enough to drill. The productive area includes Blocks 945, 947, 948, 949, 951, 952, and 953 off Padre Island along the South Texas coast. It ranges from about 1¾ miles to 3 miles offshore in water averaging about 45 ft. deep.

The discovery well, completed in 1954, was drilled about 2,400 ft. northwest of the center of the structure, which appears to be a collapsed salt dome. It was completed as an oil well but also hit at least four gas sands.

Productive sands are plentiful in Chevron. Nine apparently different producing horizons have been found between about 5,800 ft. and 9,300 ft. All are located in the Frio or Miocene.

Standard's success has been its selection of sands that appeared to be the most promising. During its 3-year drilling program, which ended in September, Standard of Texas never drilled a dry hole in Chevron field. But three of the wells were plugged and redrilled into more promising sands.

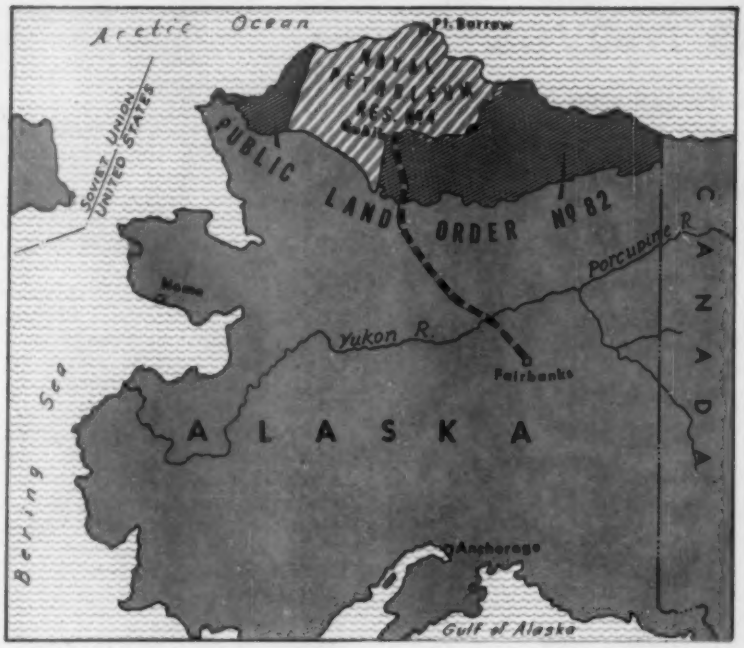
During the early days of development, gas sands frequently were passed up in search for oil. At that time, oil had a ready market while gas had to be shut in.

Gas production is now more promising than oil. Each of the nine oil wells has an allowable of 160 bbl. daily, a goal which some of them can't meet. Gas reserves are unknown, but a clue is provided in the sales contract with Texas Eastern. The pipeline company has agreed to buy up to 1 million cubic feet of gas per day for each 10 billion cubic feet of reserves. Maximum flow of 45 million cubic feet per day would indicate reserves estimated at 450 billion cubic feet.

Drilling technique . . . During more than 3 years of drilling off Padre Island Standard of Texas and its drilling contractors have become masters of directional holes. Of the 24 wells in the field, all but 5 were drilled directionally.

Holmes Drilling Co., Houston, drilled the shore locations. Drilling from offshore locations was done by Kerr-McGee Oil Industries, Inc. Holes were drilled at angles up to 45°, and they departed as much as 6,000 ft. from vertical.

It took about 90 days to drill the discovery well, and the early directional wells required about 60 days, recalls C. A. Martin, Jr., Stanotex division production superintendent. Later, holes were drilled directionally to 9,000 ft. in slightly over 3 weeks, and they were bottomed within 25 ft. of the target.



Alaska Lease Ban Ends

. . . on 20 million acres above Arctic Circle near Naval Reserve. First bidding will be on land in Gubik field.

A 14-YEAR FREEZE on oil and gas development in northern Alaska will be thawed out next month.

Interior Secretary Fred A. Seaton announced the government decision last week. He said that a 20-million-acre section of the big area in Alaska closed off in 1943 by Public Land Order 82 will be opened.

In addition, 5 million acres in the area and 4 million acres adjoining it will be turned into a wildlife range. This also will be available for leasing.

All the land lies 100 miles or more above the Arctic Circle. It surrounds the Naval Petroleum Reserve on three sides.

The reserve itself is to be protected by a 2-mile buffer zone within which no oil or gas operations will be permitted. This zone will be twice the width of the protective area required by the department elsewhere.

The first lands to be opened will be some 16,000 acres in Gubik gas field. The acreage will be leased on competitive bids. About 4 million acres flanking the Gubik structure will be opened to noncompetitive leasing.

Additional areas will be opened as maps are prepared, Seaton said.

Interest in gas . . . In view of the Navy's experience in the area, Seaton said he expects that immediate interest will center largely on gas.

Gubik field lies athwart the petroleum reserve boundary, but most of it is outside the Navy's holdings. The reserve is estimated to hold up to a trillion cubic feet of gas.

The first lands will not be opened for some 6 months. That will give time for filing easements for any oil or gas pipeline that may be proposed, Seaton said. So far, however, there are no firm plans for a line, although it has been reported that one was tentatively planned to carry Gubik gas to Fairbanks.

The 25-million-acre area surrounding Naval Petroleum Reserve No. 4 on the east, south, and west, running from the Brooks Range to the Arctic Ocean, was closed by former President Roosevelt in 1943. This cleared the way for the Navy's search for oil.

The Navy's experience . . . The Navy spent more than $45 million for exploration.

Its only results were the discovery of Gubik field, discovery of Umiat oil field, and several smaller prospects. Umiat is a small field within the reserve. It has crude reserves estimated at between 37 and 75 million barrels.

The Navy, however, made extensive geologic and geophysical surveys in the area through the U. S. Geological Survey and private contractors. Results of this work will be made available to operators going into the area when it is opened.

The 1943 public land order also closed some 18 million acres on the Alaskan Peninsula and in the Katalla-Yakataga area. This was restored to leasing in 1946.

Navy steps out . . . With closing out of its exploration program, the Navy lost interest in the area outside the reserve.

It informed Interior that it had no objection to opening up the area. There have been reports that if oil and gas are discovered in volume around the reserve, the Navy might also consider opening its lands to contract development.

Reopening the area also has been approved by the House armed services committee. No response has been received to requests for views of the Senate armed services committee or the interior committees of either house.

Victory for Alaskans . . . Ever since the Navy abandoned its exploration program, Alaskan interests have pressed for opening up the region.

This particularly was true of Gubik gas field which potentially is a source of cheap fuel for the Fairbanks area. Alaska Propane Co., which holds the franchise for sale of bottled gas in the Fairbanks area, has filed plans with the department and reportedly is interested in building a pipeline from Gubik to Fairbanks.

Engineering requirements and preliminary design for such a line were prepared more than 3 years ago by Arctic Contractor, Inc. At that time a $20-million price tag was put on a 450-mile, 8-in. line to Fairbanks. Estimates now probably would run much higher.

The project, however, still may be attractive. Dry-gas reserves of Gubik field alone have been estimated at 300 billion cubic feet, or a 30-year supply at a rate of 20,000 M.c.f. daily. Alaskans figured in 1954 that the gas could be marketed profitably in Fairbanks at 50 cents per M.c.f. and would cut the city's fuel bill by more than 30 per cent.

Canada to Celebrate in '58

CANADIANS will celebrate the 100th anniversary of the oil industry in 1958—a year ahead of oil men in the United States.

A special postage stamp will be

struck in recognition of the centennial. The stamp was proposed by the Canadian Petroleum Association to commemorate the birth in 1858 of commercial oil production in North America. Canadians date this from the completion of James Miller Williams' well at Oil Springs, 20 miles southeast of Sarnia, Ont.

U. S. oil men will observe oil's hundredth anniversary in 1959—a century after Col. Edwin L. Drake brought in his discovery near Titusville, Pa. This well is generally recognized in the U. S. as the first hole ever drilled for the express purpose of finding oil.

Alaskan Wildcat

will be deepened in spring by Havenstrite. Stepout to Kenai discovery spudded.

RUSSELL E. HAVENSTRITE and associates plan to deepen their wildcat on Alaska's Iniskin Peninsula next spring.

Tests made in the 9,747-ft. hole during the past season encouraged the group, known as Iniskin Unit Operator, to resume drilling. Earlier reports were that the wildcat would be abandoned.

Iniskin Peninsula is on the east side of Cook Inlet, southwest of Richfield Oil Corp.'s successful 1 Swanson River Unit wildcat on Kenai Peninsula. The Richfield strike has set off a rash of lease-buying in Alaska (OGJ, Nov. 11, p. 116).

The Havenstrite group began drilling the Iniskin well in 1954 and suspended at 9,747 ft. in 1955. Because of promising showings of oil and gas, the operators decided to run logs during the 1956 season. During 1957 casing was set to 9,450 ft. and tests made under the supervision of Robin Willis, geologist and petroleum engineer. Willis recommended deepening.

Drilling will be resumed as soon as weather permits in the spring of 1958.

Havenstrite is a Los Angeles independent oil operator.

Meanwhile, on Kenai, Richfield and Standard Oil Co. of California have started drilling a second well 2 miles south of Richfield's discovery. The 2 Swanson River is reported below 3,500 ft.

Richfield and Socal have a joint drilling agreement to explore their holdings on Kenai over the next several years. The new well is their first effort to extend production beyond the 1 Swanson River Unit.

Use Engineers Better

. . . by giving them help from technicians on routine jobs. This stop-gap approach is advocated at Denver meeting which sees stepped-up education as long-term answer.

FIRST IMPACT of the Sputnik Era on American industry will be in an area already nearly critical: Skilled manpower.

A group of scientific and government leaders met last week at Denver in one of a series of conferences called by President Eisenhower and came up with two conclusions. The nation must:

. . . **Use its present engineers** and scientists more efficiently.

. . . **Increase and improve the education** of technical people to enlarge the supply of scientists.

In agreement on these and other facets of the problem are James T. O'Connell, undersecretary of labor, and Paul H. Robbins, executive director of the National Society of Professional Engineers. They were leading participants in the special conference on utilization of scientists and engineers. Other conferees were engineers, industry representatives, and educators. Their findings were reported to the President.

Robbins said the main problem is that the United States is trying to serve the high birth rate of the 40's and 50's with the technical help of the low birth rate of the depression-ridden 30's.

He explained that many industries and professions share the common problem of having a lot of older employes within a few years of retirement, a lot of newcomers just learning their way, and a great dearth of people in between, the two extremes.

Robbins suggested that scientists be provided with enough clerical and technical help to handle routine chores. This, he said, would free the engineers and scientists for their speciality.

O'Connell agreed that industry must make sure the capabilities of its trained scientists and engineers are being put to full use.

If each engineer and scientist were working at top potential in a suitable job, he said, our scientific productivity would jump 15 per cent.

Teachers vital . . . The labor undersecretary added that the United States must improve the educational structure by getting the best teachers possible and paying them properly.

He charged industry with "stupidity" for luring teachers away from their profession.

"This is a form of employment piracy that has reached serious proportions," O'Connell said. "Last year, 2,000 of the 5,000 teachers' college graduates in mathematics and science went not to the classroom but to industry."

He predicted the high demand for engineers will last for a long time. Out of a manufacturing work force of 16.5 million now, there are 439,000 engineers. He estimated the United States will have a work force of 20 million by 1965, requiring 615,000 engineers.

"We'd better start doing the spadework now if we are going to have the people we need to fill current demand and also meet even greater needs of the years just ahead," he declared.

Technicians needed . . . This was stressed at the conference by Dr. Kenneth L. Holderman, assistant dean of engineering at Pennsylvania State University and chairman of a division of the American Society for Engineering Education.

"Our junior colleges and technical training schools are turning out only 15,000 engineering technicians yearly, while our colleges and universities are giving us 30,000 graduate engineers. That's only half enough engineers—we need at least 60,000 of them.

"But the lack of technicians capable of running tests, making routine checks, acting as liaison men between the chief engineer and the work crew—this lack is hamstringing the engineers we do have. Instead of making decisions, instead of overseeing and directing the work of others, too many of our engineers are forced to do their own technician chores."

Dr. Holderman said that when an engineer is allowed to operate only in the fields of his highest qualifications, supported by technical help, he thus becomes more of a scientist. Technicians, he added, can serve in all the areas filled by the engineer now.

"In research and development, they work directly under an engineer. In production, they follow the engineer's plan. In installation and sales, they put into effect the ideas of the engineer."

Import Plan on Target

. . . for the first time in October, but receipts over next few months are expected to top government allocations.

AMERICAN OIL importers cut their October cargoes by 15,500 bbl. daily from the September figure.

That brought their receipts to 4,400 bbl. daily below the 771,400-bbl. allocation set up by the Government when the imports-control program was launched last July 29.

Company reports and estimates filed last week with Capt. M. V. Carson, administrator of the program, indicate that November imports also will be below the allocation. They are estimated at 744,000 bbl. daily.

Imports, however, may be expected to rise after November. Beginning with December and continuing through March, schedules of importers show that receipts will go as much as 53,000 bbl. daily above the allocation.

For the 5-month period ending with March, imports will average 794,600 bbl. daily, an excess of 23,000 bbl. daily.

The breakdown . . . The October reports to Carson brought out clearly:

. . . Established importers as a group are hewing to the line of quotas assigned by the Government.

Their receipts for the month averaged 474,900 bbl. daily and this month will drop to 445,000 bbl. Their allocations totaled 493,100 bbl. At no time over the 5-month period will imports of these companies exceed quotas. Their average, in fact, will be 473,200 bbl., or 20,000 bbl. below allocations.

. . . New importers as a group will bring in cargoes well above allocation of 278,300 bbl. daily.

October receipts totaled 292,100 bbl. This month they will reach 298,200 bbl. Average for the 5-month period is estimated at 323,200 bbl. daily.

East-of-California Imports

(Thousands of barrels daily)

Company—	October (actual)	March 1958 (estimated)	Allocation
Established Importers			
Atlantic Refining Co.	58,000	55,700	58,900
Gulf Oil Corp.	120,700	103,000	111,600
Sinclair Oil Corp.	67,700	58,400	62,200
Socony Mobil Oil Co., Inc.	72,600	67,100	67,100
Standard Oil Co. of California	48,300	59,200	66,800
Standard Oil Co. (N. J.)	73,000	72,000	72,000
The Texas Co.	34,600	59,800	54,500
New Importers			
Cities Service Co.	34,000	32,000	32,600
Crown Central Petroleum Corp.	.....	.....	5,000
Eastern States Petroleum Co.	35,000	27,000	18,300
Gabriel Oil Co.	.....	12,900	7,500
Great Northern Oil Co.	33,700	33,000	33,000
International Refineries, Inc.	3,200	13,000	12,300
Lakehead Pipe Line Co.	100	300	300
Lake Superior Refining Co.	4,500	5,300	5,000
Northwestern Refining Co.	4,400	18,000	13,500
Phillips Petroleum Co.	8,300	12,000	12,000
Shell Oil Co.	.....	5,000	7,500
Standard Oil Co. (Ind.)	27,300	29,000	29,800
Standard Oil Co. (Ohio)	12,300	5,000	8,200
Sun Oil Co.	60,000	52,400	50,400
Tidewater Oil Co.	64,100	*64,000	34,200
Southwestern Oil & Refining Co.	3,600	3,600	2,900
Bay Petroleum Co.	1,300	5,500	3,200
Dow Chemical Co.	300	400	300
Texas Asphalt & Refining Co.	.....	3,500	2,300
Total	767,000	797,100	771,400

*Estimated by Oil and Gas Office.

Making progress . . . Interior Sec. Fred A. Seaton said he feels the control program is going along "reasonably well."

Seaton pointed out, however, that three companies "have not yet cooperated as much as we would like." He identified the three as Eastern States Petroleum Co., Sun Oil Co., and Tidewater Oil Co. He said Eastern States has promised to cooperate if and when it can settle a contract problem.

Seaton added: "I would be happy if Sun and Tidewater would announce formally their compliance with the program."

Carson, meanwhile, announced that several new companies have announced their intentions to start importing. They are Frontier Refining Co., Southeastern Refining Co., Falcon Petroleum Co., and United Refining Co. On the West Coast, Superior Oil Co. and American Independent Oil Co. have indicated they also will seek to bring in foreign oil.

Oil Shale Allowed Depletion

DISTINCTIVE QUALITIES of oil shale have been formally recognized by the Internal Revenue Service.

The IRS ruled last week that shale mined solely for its kerogen content is entitled to depletion at the rate of 15 per cent.

"It appears that 'oil shale' does not contain oil as such, but contains kerogen, a material from which 'shale oil' is derived and for which it is mined," the IRS said in its ruling.

"The distinction between 'shale' and 'oil shale' is evident since shale is mined and used as such, while oil shale is mined and used merely as a source of kerogen."

The 15 per cent allowance will not apply, however, to oil shale used or sold for use as riprap, ballast, or similar purposes. Such shale will continue to be allowed only 5 per cent depletion.

Houston Hits Again

as wildcat on city's prison farm yields 168 bbl. a day

A NEW OIL DISCOVERY on Houston's city-owned prison farm last week stole the spotlight from a garbage dump which already is bringing the city about $450 a day in royalties.

Trice Production Co. found oil while drilling the north flank of a gas and distillate field about 10 miles southeast of downtown Houston. The producer is on the north flank of Mykawa dome.

The 1 City Prison Farm, located inside the city limits, is more than 1 mile from nearest oil production and about 2,000 ft. north of the nearest gas producer. Trice said it produced at the rate of 168 bbl. of oil per day through 10/64-in. choke. Production is from 8,786-92 ft.

Dan McCauley, district manager for Trice, indicated a discovery allowable will be sought for the well.

Trice paid a bonus of $8,275 for the prison farm lease, covering about 330 acres. The tract is about 4 miles east of Holmes Road garbage dump where Trice established production in August 1956. The dump lease now has 10 producers with a combined output of about 600 bbl. daily. The city retained 25 per cent royalty on both leases.

Texas Lawmakers Busy

THE TEXAS LEGISLATURE is busily passing resolutions striking back at oil importers and urging a pipeline outlet for shut-in West Texas crude.

The house concurred with senate amendments to a resolution calling on state officials to quit buying products from oil companies which exceed their import quotas.

Three other resolutions also have house approval. One directs the state attorney general to determine whether importers are discriminating against Texas oil by refusing to take full allowables. Another asks Congress to impose a substantial tariff on oil imports. The third proposes that a large portion of imported oil be stored in depleted or nearly depleted oil formations as a defense measure.

The senate has passed a resolution calling on federal officials to approve the long-stymied West Texas-to-California big-inch crude line. Senators claim the pipeline would link an oil-surplus area to one short of crude.

watching WASHINGTON

. . . with Bertram F. Linz

FPC backlog piles up

EVIDENCE OF THE NEED for passage of the Harris gas bill is mounting in the Federal Power Commission.

More than $33 million in gas-price increases for independent producers is pending in cases suspended by the FPC. Over $2.6 million in rate advances was suspended during October alone (see related story, p. 66).

The commission's backlog is piling up steadily. Last month 164 of 606 rate applications filed were suspended. This brought the total suspensions to 696.

Suspended certificate applications also are rising. In October, 28 of 113 filed were held up to bring the total to 1,813.

Basic questions in producer rate control are involved in some of these cases. The most important of these deal with the kind of cost data needed to support a rate increase. But the FPC's power to call for costs in any independent producer rate case is being challenged in the courts.

The issuance of conditional certificates is another problem. The FPC tried this approach to cut the price to be charged by the CATC Group, but dropped it when the producers refused to bargain.

Where will the budget ax fall?

AUSTERE IS THE WORD for government spending next year.

Interior Department oil and gas branches are likely to feel the weight of economy as the administration tries to offset increased military spending by cutbacks in other fields.

The missile race will be costly. It may wipe out all chances for a budget surplus and tax reductions. It is strongly suspected, in fact, that the public is being conditioned for higher taxes.

The President has served notice that it will be necessary to wipe out whole programs to get more money for security. There will be little chance for federal agencies to get more money for work they are now doing, except where the need is imperative.

The 1959 budget is now being worked up. High-level talks are going on to pinpoint the spots for retrenchment. Just what programs will be cut out is yet to be decided. But one thing is sure. The budget that goes to Congress next January will be the tightest in many years, so far as the government's civilian activities are concerned.

Railroads and the horseless carriage

GASOLINE IS CHASING the railroads out of the business of hauling people.

That is the word from the company which carried the first rail passengers, way back in 1830. The Baltimore & Ohio has asked three states to let it drop passenger service along the eastern seaboard.

The bus, private automobile, and airplane—all gasoline powered—did the trick. The only time passenger traffic pays its way is when highways are snowed in or planes fogbound, railway officials say.

Other carriers are watching the B & O's effort to cut its passenger service. If it succeeds, several are expected to ask the same relief from states now served.

Even the freight business, the backbone of the rails and still highly profitable, is feeling the impact of the gasoline era. The volume is still there because the nation's business keeps expanding. But an estimated 60 per cent of the goods moved around the country now goes by truck, pipeline, or water.

The airplane, too, is taking a good chunk out of the low-weight, high-rate business. That's why the New York Central and Pennsylvania, as well as other roads, are thinking of mergers.

Colorado Interstate: Problem for All

FPC's time-killing red tape, its method of cost allocation, and its attitude toward the pipeline-producer are driving a company into bankruptcy. Others are facing the same plight unless Government overhauls its regulations.

Gene T. Kinney
Assistant Pipeline Editor

COLORADO INTERSTATE GAS Co. dramatizes today the plight of a gas-transmission company that produces its own gas. The only difference is that CIG's problems are more acute than others: The company is on the brink of bankruptcy.

The oil and gas industry has been shocked by the disclosure that the pioneer Colorado Springs firm is going broke.

The company, with assets of more than $130 million, says it is threatened with financial ruin if a Federal Power Commission examiner's decision is allowed to stand.

Backing the company's contention is the word of independent accountants whose figures are accepted throughout the industry.

What's at stake . . . CIG expects the full commission, in a decision due at any time, to reverse the examiner. It would seem that the commission could ill afford to have a company under its jurisdiction bankrupted because of a regulatory order.

But the issues involved are far bigger than this individual case. For this company is not alone. The problems which beset CIG are common to both the producing and transmission segments of the industry.

CIG, being a large producer as well as a transporter of gas, has all of the headaches of both. The difference is one of degree. What is a long-term threat to others is painfully immediate to this company. CIG believes the same end is in store for others unless regulatory faults are corrected.

This story may sound like an old refrain to regulatory officials and to consumers whose interests the FPC is bound to protect. But the figures lend an authenticity which is hard to ignore. To that extent, the CIG incident may well have been a good thing for the industry. The company, however, finds little consolation in this.

The problems in the case, and the solutions, are not very new. But never have they been brought into focus quite so clearly.

Problems . . . How did Colorado Interstate get that way?

The Troubles of Colorado Interstate began when FPC Examiner Samuel Binder disallowed proposed rate increases totaling $20 million per year, based on the test year 1954.

Applying the rates authorized by Binder, CIG's President W. E. Mueller (left, above) and Vice President J. P. Roetzel (right) contend their company wouldn't have earned any dividends on its common or preferred stock. Nor would it have earned a substantial portion of the interest on its bonded debt.

According to Mueller, Binder's rates would have given CIG a net operating income for 1956 of $1,168,192, while interest for debt in the same year was $1,988,747. This would be a loss of 49 cents per share of common stock. The same is true for the first 3 months of 1957—a net operating income of $440,752 and interest requirement of $580,906.

If the examiner's decision is upheld, it would appear that CIG would be in immediate default on its bonded debt. Or, in one word: Bankrupt.

CIG's appeal to the full commission asks that increased investment and operating costs since the 1954 test year be taken into account. The FPC is expected to rule on the appeal this month.

The company has been the victim of several evils, which are summed up by W. E. Mueller, president, in this fashion:

... **Higher interest rates** without a corresponding increase in return.

... **Regulatory time lag.** By the time one case has been decided, the costs have so changed that the former base no longer applies.

... **No incentive price** for gas.

... **Unfair cost allocation** principles.

... **Discrimination** against pipelines which produce their own gas.

... **Obsolete methods** of handling rate cases.

... **Unfavorable investment climate** in the gas industry.

If the first six problems are worked out, the last—on investment capital—would be solved automatically.

Time lag . . . Whoever or whatever is at fault, the effect of time lag between filing of cases and an FPC decision is perfectly illustrated in CIG's case.

Time lag is a big reason for the bankruptcy threat. CIG is in the position of having operated for almost 4 years without knowing what its earnings are. Rates have been unsettled since January 1, 1954. More than $60 million in revenues is tied up in rate cases pending before the commission. While this is an extreme example, it is by no means isolated. There are some $200 million in annual rate increases on file with FPC.

The basic issues in the CIG case aren't too complicated: The commission must ascertain a unit cost of service per M.c.f. This would be based on operating costs plus a fair rate of return on net investment in properties and working capital.

The hitch is that the examiner disagreed with the company by nearly $35 million in adding up operating costs and return.

They disagreed on allocation of costs. The FPC staff and the opposing intervenors sought to allocate to intrastate (as against interstate) costs in Texas more than $1 million above what CIG figured it actually receives for the gas involved. Sums which are allocated to intrastate costs cannot be used in calculating the base on which interstate rates are fixed by FPC.

Rate of return . . . The company asked for a 6½ per cent rate of return on net investment and was granted the traditional 6 per cent. On the basis of capitalization June 30, 1957, using the same allowance for common equity as the examiner, the cost of financing now figures at a minimum of 6⅔ per cent.

CIG asks for 6½ per cent as the minimum needed for a fair return on equity capital. This would partially recognize higher interest, which has doubled since the 6 per cent return was established for gas lines. As costs of borrowed money have increased, the earnings on common stock have decreased.

Latest figures from FPC show that operating revenues of natural-gas pipeline companies for the 12 months ending in August were 10.9 per cent above the previous year. Net utility plant increased some $600 million or 15 per cent. Utility operating income, which, like operating revenues, included money subject to refund pending outcome of rate cases, was up 4.3 per cent. But net income was down 0.4 per cent, in spite of an increased rate base and increased sales of 8.1 per cent.

As to charges of unreasonable rates, CIG points out that during 1946-56 the consumer price index advanced almost 40 per cent while its average gas price to the consumer was up only 20 per cent. The cost of gas in Denver is 2 per cent less than it was in 1939. Consumer prices on all items are up almost 100 per cent over that year.

CIG also protests that it is not accorded the same tax benefits on production that other producers receive. The company says it is not allowed to add depletion and drilling expenses to its recoverable cost of service.

Fair field price . . . Field prices of gas produced by CIG are another major issue.

"It is this matter which needs clarifying by Congress," Mueller says. The company has amassed evidence which it believes justifies a field price of 9.67 cents per M.c.f. for its own production in West Panhandle field. This would produce revenues to support exploration and development to replace reserves and maintain deliverability.

The company is paid 3 cents per M.c.f. for gas, while other producers in the same area are permitted 12, 15, and 17 cents under newer contracts.

Unless higher prices are approved, the company is in a position of liquidating its own reserves without replacement. Mueller contends that under the rate treatment proposed by opponents in the FPC case the company would receive on its own gas less than one-tenth of a cent per M.c.f.

"This would not only be wiped out, but heavy penalities and losses would be assessed against us by virtue of our ownership of large Panhandle field reserves through the imposition of the unfair cost allocation," he says.

CIG, and many other transmission companies, believe the ideal situation from their own as well as the consumer standpoint lies in complete control over their gas supplies. The reasons: More operating flexibility and guaranteed supply.

To maintain its present position, CIG would like to support a $10-million annual exploration program. This is impossible under present circumstances. The company has pulled in its horns until the issue is settled on field prices and rates. Until its financial status is clarified, it must hold back on exploration and postpone all expansion.

What chance for help? . . . CIG believes the FPC recognizes the need for some reforms. The commission has gone on record for the fair field price but was reversed by the courts. Nobody yet agrees on how to arrive at the "reasonable price" to which producers are said by the FPC and the courts to be entitled.

CIG believes the price situation eventually will be straightened out by legislation and court tests which will clarify the new regulations. And here is the key to success of reforms which might be approved, the company believes. The burden for proving the need for more livable and workable rules to the satisfaction of the courts is on the companies themselves. No one else will "educate" judges as to the unique aspects of the industry so they can render fair decisions when new legislation is before them.

CIG's Mueller says:

Here's the Solution

1. Legislation

. . . to clarify rules and procedures and speed handling of the vast volume of cases before the FPC. The Harris bill would do it.

2. Higher rate of return

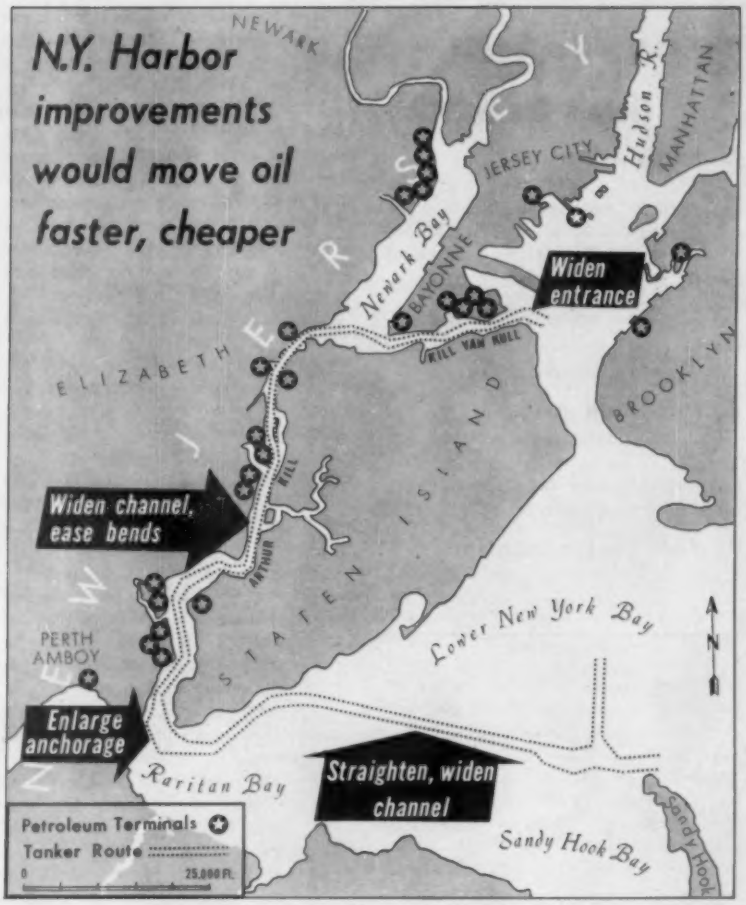
. . . on investment in recognition of higher interest rates.

3. Incentive price

. . . for field gas to enable producers to prove up new reserves and guarantee long-term supplies for consumers.

4. Fair cost allocation

. . . by FPC for determining a proper rate base.



Bigger Channels Needed

. . . for fast-growing tanker business in the world's biggest oil market. Spending of $200 million is believed justified.

THE BUSIEST WATERWAY in the United States—and possibly on earth — must be widened, deepened, and straightened if it expects to keep up with the heavy demands of the oil industry.

Port officials and oil companies using New York Harbor are asking the U. S. Army Engineers to take the lead in recommending to Congress that funds be appropriated to do the job.

The House public works committee requested a review of the project a year ago and may include the proposed improvements in an omnibus rivers and harbors bill after the session opens in January.

The last allocation of funds was $21 million to deepen the channels by 5 ft. to their present 35 ft. But that's not enough. Another 10 ft. is needed. Also the channels should be widened to 900 ft. wherever possible, compared with the 500-ft. width at some spots today.

And the longest straightaway, from Sandy Hook to Perth Amboy (see map) needs to be rerouted.

The American Merchant Marine Institute says the improvements would save $8 million per year, and thus would justify spending $200 million.

Where oil comes in . . . The oil industry's stake in the harbor project is enormous. The harbor has berths for 54 tankers and takes more than one million barrels of oil per day. Ninety per cent of all traffic in the affected channels is oil from the Gulf of Mexico, Venezuela, and the Middle East.

Shippers could save huge sums of money if the channels were widened and deepened. For example, a 45,000-ton tanker—comparing it with a 16,500-ton T-2—can save $2 per ton on shipments from the Caribbean and up to $5 from the Middle East. That's 6⅔ to 33⅓ cents per bbl.

Tankers of more than 32,500 tons can use the waterway only in daylight hours with favorable tide, current, and wind. They must then pump out enough oil at their berths to prevent sitting on bottom at low tide. Tankers of 45,000 tons must offload about 10,000 tons before entering the channels.

According to the AMMI it costs $300 per hour to operate a 32,650-ton tanker and $400 for a 47,000-tonner. The delays which result from inadequate channels thus mount quickly into big money.

Conditions are going to get worse. Member companies of the Merchant Marine Institute report they expect to handle 50 per cent more oil cargo by 1960 and 70 per cent more by 1965.

Already the companies themselves have spent $26 million since World War II improving their facilities and have programed another $21 million.

More Gas Details

will be required by FPC. Producers to file reports by December 31.

INDEPENDENT GAS producers were given notice by the Federal Power Commission that their reports on sales and revenues in 1956 will require more information than was sought in 1955.

But the reports, which must be filed by December 31, will be less detailed than originally planned by the FPC. The culling out was the result of protests filed September 5.

The new form calls for data on the total volume of sales under each individual contract, including those of all parties to the contract; interstate sales for which no separate filing was made; information to permit identification of duplicate rate filings; and financial data.

The original draft was revised, however, to permit the reporting of gross sales and revenues on an estimated basis if the producer keeps his records on a new basis.

It also permits producers to report on either a calendar or fiscal-year basis, and limits the information required of producers with sales not over 2 billion cubic feet annually.

Commissioner Seaborn L. Digby dissented, however. He declared the requirements are inconsistent with policy statements made by the commission. Some of them, he charged, conflict with other FPC orders.

Independents Lose Fight

. . . in lawsuit testing FPC authority over "unintegrated" gas producers. Appellate court denies Saturn petition.

SMALL INDEPENDENT producers lost a round in the fight over federal regulation of natural-gas sales last week when the Tenth Circuit Court of Appeals in Denver denied a petition by Saturn Oil & Gas Co.

The lawsuit, supported by eight independent producers' groups in five states, was testing whether the Supreme Court, in the Phillips case, intended to place small unintegrated gas producers under Federal Power Commission regulation.

Denial of Saturn's petition has the effect of upholding the commission's right to regulate natural-gas prices at the wellhead.

Specifically, Saturn's petition asked the court to force the FPC to review the order placing small independent gas producers under federal rate regulations.

Saturn, a small Kansas producer, said it is not a natural-gas company within the meaning of the Natural Gas Act. It contended the FPC had no power over Saturn's gas sales made at the wellhead, although the gas is immediately commingled with other gas and piped in interstate commerce.

Commission attorneys, appearing personally at the hearing, argued that sale of gas for interstate shipment by Saturn, whether at the wellhead or away from the well, made the firm subject to commission regulation.

The opinion was written by Judge Jean S. Breitenstein and concurred in by Judges Sam G. Bratton and Walter A. Huxman.

Wide support . . . The eight oil and gas associations had filed an amicus curiae (friends of the court) brief on behalf of Saturn.

They contended that the Supreme Court, in holding Phillips Petroleum Co.'s natural-gas operations subject to FPC control, meant that only large integrated firms should be affected and that FPC's regulatory powers should be limited to gas sales made "after production and gathering have ended."

The associations said that Saturn differs from Phillips because:

. . . Saturn's sales occur at the wellhead.

. . . The firm doesn't process gas for resale to pipelines.

. . . Gas is not transported across state lines en route to the processing plant.

Associations which filed the brief included Texas Independent Producers and Royalty Owners Association, West Central Texas Oil and Gas Association, North Texas Oil and Gas Association, Texas Panhandle Producers and Royalty Owners Association, Independent Producers and Royalty Owners Association of New Mexico, Kansas Independent Oil and Gas Association, Louisiana Independent Producers and Royalty Owners Association, and Oklahoma Independent Petroleum Association.

In a similar case the Kansas Supreme Court recently held that natural-gas sales similar to those of Saturn's were not subject to federal control. This ruling was appealed to the U. S. Supreme Court where the case is now pending.

The eight associations joining the Saturn suit had said that a victory for Saturn would mean a "victory for thousands of small gas producers far more sweeping than passage of the vetoed Harris-Fulbright bill or the new Harris bill now pending in Congress."

Monopoly Trial Nears

. . . in California against seven majors. Date and place may be set December 19. Senator Morse demands action.

THE FEDERAL Government's 7-year-old monopoly lawsuit against seven West Coast majors and the Conservation Committee of California may finally go to trial next spring.

The apparent speedup in the long-delayed case comes at a time when Sen. Wayne Morse is calling for a quick trial.

Morse said in Washington last week the trial delay is stifling antitrust enforcement in the petroleum industry. The Oregon Democrat said the Justice Department and the Federal Trade Commission are citing the unsettled West Coast suit as the reason for lack of action on other complaints involving the same monopoly issue.

Time and place of the trial probably will be set December 19 at the next pretrial hearing in Los Angeles.

Hearings held . . . Attorneys for the Government and the companies have been holding monthly pretrial hearings for some months to eliminate as much detail as possible prior to the actual trial.

The Government charges the seven companies and the Conservation Committee with creating a monopoly on the West Coast. It asks that each integrated company be broken up into four categories—production, refining, transportation, and marketing.

The seven companies are Standard Oil Co. of California, Union Oil Co. of California, Richfield Oil Corp., The Texas Co., Shell Oil Co., General Petroleum Corp., and Tidewater Oil Co.

U. S. District Judge James Carter will hear the case, despite his transfer from Los Angeles to San Diego a year ago. Whether the trial will be held in Los Angeles or San Diego is undecided, and so is the date. The Government is pressing for trial in the spring of 1958.

As things now stand, the case is set for San Diego in Judge Carter's regular court. But five of the defendants and the Government agreed last week to switching it to Los Angeles if Judge Carter will go along with the change.

One difficulty is that Carter would have to grant numerous recesses so that he could return to San Diego to hear his regular calendar of cases.

Morse's position . . . In Washington, Senator Morse wrote a letter to the new attorney general, William P. Rogers, stating that Rogers is "in a fine position to take a fresh look at the suit pending against the West Coast majors." Morse is a member of the Senate small-business committee.

"You can personally inquire into the conditions which have caused the intolerable delay of 7 years, then take whatever steps are necessary to eliminate such conditions," the senator said in the letter.

Morse suggested that Rogers first move "with vigor and determination" toward an early trial of the case.

"In doing so you will reflect great credit upon your office and bring justice to the petroleum independents and consuming public on the West Coast," he wrote.

As long as trial is delayed, the practices on which the suit is based will c o n t i n u e unchecked, Morse warned.

THE "SEISVERTER" is demonstrated to K. M. Lawrence (left) of Amerada Petroleum Corp., by E. J. Crossland (center) co-inventor, and Gerald Westby, president of Seismograph Service Corp. It points the way to a . . .

New Look at Old Seismograms

A NEW GEOPHYSICAL tool is opening the door to a second, closer look at old seismic records.

Seismograph Service Corp., Tulsa, has unwrapped its new "seisverter," which permits geophysicists to incorporate old seismograms with the latest field information. The new instrument converts ordinary field records into corrected magnetic tapes, or feeds old data directly into corrected seismic cross sections. How to incorporate the old and the new has been a big problem—and an expensive one for some companies which have reshot some areas covered by previous surveys. This problem has been especially acute with companies using tape recordings.

How it works . . . Basically the seisverter consists of three drums. The original field record is placed on a tracking drum. Variable density or conventional galvanometer traces are produced on recording film or paper placed on a cross-section drum.

Magnetic records are obtained from tapes placed on a magnetic drum. These magnetic tapes can then be filtered, mixed, or composited before the records are added to a seismic record section.

An automatic tracking device follows the traces on the original seismic record. The operator can manually override the automatic tracker through zones of crossed traces.

The unit will handle original record speeds of 9 to 17 in. per second, and automatically corrects for variations in original record speed by comparing the time lines on the original with time impulses from a standard timing drum.

The new device was designed by Dr. James E. Hawkins and E. J. Crossland, both of SSC's Tulsa headquarters. It was unveiled at the recent national convention of the Society of Exploration Geophysicists at Dallas. SSC plans to manufacture the new tool and make it available to the industry.

TV Spies on Boiler Flame at Humble Plant

A CLOSED-CIRCUIT television system used by Humble Oil & Refining Co. keeps a constant check on the flame inside a boiler at the company's Baytown, Tex., refinery.

Before the TV system was installed, the operator kept an eye on the flame through a peephole. Now the peeping is done by a TV camera.

The picture is transmitted about 100 ft. to the control room at Hydroformer No. 1 (see photo). If the flame goes out an alarm is sounded in the control room. The alarm system also shuts down the furnace automatically after a short delay, unless the operator pushes a button to prevent it.

Before TV, the furnace operator was stationed in a "dog house," which protected him from the weather during his vigil. Automatic controls release the operator for other duties.

The furnace, a flu gas generator, serves two Hydroformers.

Celanese Introduces New Petrochem Process

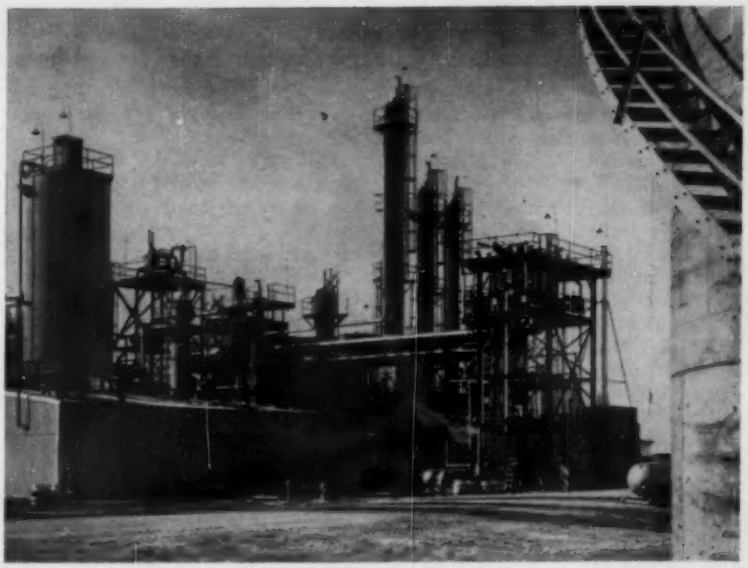
A NEW METHOD for making acrylate esters is being used by Celanese Corp. of America at a new petrochemical unit in Pampa, Tex.

The process uses acetic acid and formaldehyde and is reported to be more economical than other processes. The method was discovered by B. F. Goodrich Co. and was developed by Celanese.

The new plant will produce 15,000,000 lb. of acrylate esters per year. It supplements other Celanese facilities in Pampa for production of acetic acid, acetic anhydride, and vinyl acetate. The company also makes acetic acid and formaldehyde at its Bishop, Tex., plant.

Acrylate esters are used in the paint, leather, textile, and paper industries. Demand for the product has doubled since 1954 and is expected to double again by 1960. Celanese officials say there is a growing trend toward formulating paint based on polymers made of combinations of monomers in which acrylate esters will play an increasingly important role.

Richard W. KixMiller, vice president and general manager of the company's chemical division, said immediate production at Pampa will include methyl, ethyl, and butyl acrylates, but Celanese is also developing markets for the higher esters of acrylic acid.



Acrylic polymers derived from acrylate esters are clear, colorless, tough, stable, rubbery compounds. Production of these polymers began in this country about 25 years ago. Demand increased in World War II, and accelerated 3 years ago when they were used for the first time in water-thinned paints.

Nickel-Lined Barge Moves Glycerin by Water

THE PETROCHEMICAL industry has found a way to move glycerin and hexylene glycol by water. Last week for the first time, the two products went to market by barge.

The shipment was made in a nickel-lined four-barge tow—a new concept in inland water transportation and the first to be built for the sole purpose of carrying high-purity chemicals.

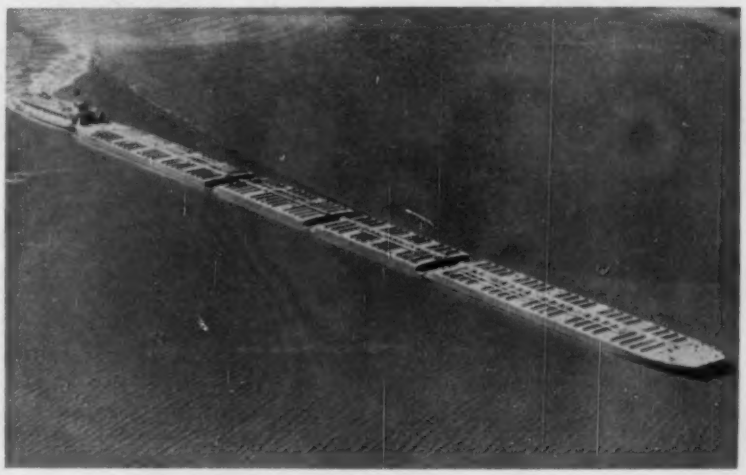
The new tow is being used to move petrochemicals from Shell Chemical Corp.'s Houston plant, up the Mississippi River to Chicago. Round trip takes only 22 days.

What it means . . . The new barge chain, owned by Dravo Corp., Pittsburgh, permits bulk marine movement of chemicals that previously moved only in specially lined tank cars. The nickel protects such chemicals as ketones and glycerin from iron contamination.

Capable of carrying 14 different products on each trip, the combined capacity of the four barges is 60,000 bbl. Only three of the four barges contain nickel-lined compartments.

All four barges are of double-skinned construction—a hull within a hull. Steel girders, normally placed on the underside of the deck, have been placed on top of the deck. This leaves all compartments free of internal obstructions, makes cleaning easier, and insures product quality.

The four-barge tow is 750 ft. long, 50 ft. wide and 14½ ft. deep. The towboat is rated at 2,560 hp., and has facilities to steam heat the nickel-plated glycerin compartments.



Payout Lags in Gulf

. . . because of low allowables, high operating costs, and state-federal squabble, Conoco executive tells lawmakers.

A PAYOUT for the oil industry in the Gulf of Mexico is far behind schedule, and the deficit is growing every day.

This gloomy conclusion was presented by Ira H. Cram, senior vice president of Continental Oil Co., in a statement before a subcommittee of the House judiciary committee. The subcommittee, headed by Rep. Edwin Willis of Louisiana, met in New Orleans to study legal problems affecting the offshore oil industry.

Cram, usually optimistic in his appraisal of offshore oil, pointed out that industry is at least $1.6 billion in the red as a result of its offshore venture. He estimated that expenditures have totaled more than $2 billion while revenue from production has amounted to only about $400 million.

He added that the industry's loss in offshore operations is continuing to mount "since expenditures are still more than double revenues."

Cram compared offshore results with accomplishments of the industry in Alberta. In each case, most of the development has been done since World War II.

"It so happens," Cram noted, "that at the end of 1956, the industry had also spent approximately $2 billion in Alberta in exploration and development in the 9-year period following the Leduc discovery.

"During the period the Alberta industry produced almost four times as many barrels of crude oil as the offshore industry, and at the end of the period had a daily production over three times as great, three times the crude proved reserves, and over three and one-half times the natural-gas reserves."

The Continental executive still describes the Louisiana offshore area as "good hunting grounds" which promise to be "about as productive as the onshore area of South Louisiana."

Why the losses . . . He cites three major reasons for the heavy losses in offshore operations:

. . . The controversy between the states and federal Government over control of the offshore region.

. . . Low and declining allowables for offshore production. Allowables are now about 30 per cent as high as they were in the early stages of offshore operations.

. . . High costs of offshore operations.

Howard A. McKinley, regional land superintendent for Continental Oil Co., spoke at length on one of the major factors in offshore operating expenses—the high cost of leases.

Texas, Louisiana, and the federal Government have realized more than $410 million from their 42 offshore lease sales, McKinley pointed out. In recent sales leases have gone as high as $2,000 per acre.

"How realistic the recent bonus figures are," McKinley said, "is a question which troubles many in industry."

Hussey wants new law . . . Louisiana Conservation Commissioner John B. Hussey, another witness questioned by the committee, recommended new legislation to cover oil produced outside state limits in the gulf. He expressed the opinion that the Connally "Hot Oil" Act would not apply to oil produced beyond the state line.

Gas Plans Made

by Trans-Canada for both western, eastern cities.

TRANS-CANADA Pipe Lines, Ltd., will be pumping gas at both ends of its system this winter.

Trans-Canada already is serving cities on its western section from the Alberta-Saskatchewan border to Winnipeg. Soon gas will start flowing through the newly completed Toronto-Montreal section, supplied by "loans" from Union Gas Co. of Canada, Ltd. Union will use its Ontario underground storage.

Charles S. Coates, president of Trans-Canada, and Union President David P. Rogers announced last week they had completed a contract to supply eastern Canada cities until next fall. By November 1958 the Ontario section will be in the ground, completing the 2,500-mile line from Alberta to Montreal. The loans then will be repaid with Alberta gas.

Northern Ontario Pipe Line Crown Corp. let contracts last week for 360 miles of 30-in., which the provincial and dominion government firm will build. Awards went to Nelen, Ltd., Majestic Contractors, Ltd., River Construction Corp., Ltd., Mannix, Ltd., and Morrison Shivers, Ltd. This section is between Port Arthur and Kapuskasing. Trans-Canada will let contracts later on 491 miles of 30-in. from Kapuskasing to Toronto, filling in the last gap on the line.

Field Merger Asked

in order to keep pressure up, prevent loss of crude.

FOREST OIL CORP. last week asked the Texas Railroad Commission to either (1) merge Virey and Dora Roberts Devonian fields or (2) cut Virey to 6 producing days a month.

Forest said the two Midland County pools actually are one. Pressure is dropping so rapidly it may fall below the saturation point before pressure-maintenance operations can be started, Forest said. Dora Roberts operators have kept this field on a 6-day schedule to prevent this, and the same restriction should be applied to Virey, Forest contended.

A Forest spokesman said Virey now is producing only 689 bbl. of oil for each pound of pressure drop. Pressure, he said, is now down to 5,044 psi. from the original 5,400 psi. and will fall below saturation pressure of 4,450 psi. within 2 years if the producing rate is not cut.

If this should happen before pressure maintenance can be started, much otherwise - recoverable oil would be lost.

Cities Service Production Co. and Docia Brown Estate agreed with Forest.

TXL Oil Corp. asked the commission to deny the application. TXL said it favors unitization and pressure maintenance but asserted Forest didn't present enough evidence to warrant merging the fields or cutting the allowable to 6 days.

In the event the commission should approve the application, TXL asked that the order be limited to a period of 6 months and that Forest then be required to show progress toward unitization and to demonstrate a need for further restriction.

Washington Offset Halted

SUNSHINE MINING CO. has suspended operations on its 2 Medina, the first offset to the company's Ocean City discovery well in Washington.

Spokesman for the company indicated a second test will be spudded, probably south of the discovery.

Sunshine Mining gave no explanation why the 2 Medina was suspended. The company reported earlier this month it had lost the Nye zone in

the well when casing and liner collapsed (OGJ, Nov. 18, p. 151).

A subsequent 2-hour test of a shallower zone at 2,590-2,602 ft. flowed a little oil for a time, and then the flow died.

New Play in Canada

could be touched off by first good Ordovician oil shows in Saskatchewan.

GOOD RECOVERY in a wildcat in southern Saskatchewan could open an entire new section for Ordovician exploration in Western Canada.

Imperial Oil, Ltd., had good shows of Ordovician oil at its 6-13-2-19 Hummingbird, 25 miles northeast of Ordovician production at Montana's Outlook field.

On a drill-stem test at 9,848-75 ft., recovery was 2,500 ft. of oil-flecked water cushion and 240 ft. of oil. Another test at 9,875-95 ft. netted 2,520 ft. of oil-flecked water cushion, 765 ft. of oil containing 10 per cent salt water, and 540 ft. of salt water.

The operator took four drill-stem tests, covering 97 ft. of hole. Only the top two tests, covering 47 ft., showed oil.

There is no Ordovician production in Saskatchewan, although the Williston basin portion of Saskatchewan and Manitoba does contain an Ordovician section.

But both the Ordovician and Silurian have been tapped for good production at Outlook field in Montana. Successful completion of the Imperial wildcat will probably move the deep-drilling campaign now in progress across the border in Montana and North Dakota into southern Saskatchewan.

Pipeline briefs

El Paso Natural Gas Co. has completed a 98-mile line in the Texas Panhandle and work is proceeding on its San Juan line looping. R. H. Fulton & Co. had the contract for the 81 miles of 18-in. and 17 miles of 20-in. between the Panoma plant, Panoma County, and the Dumas plant, Moore County, Texas.

Fulton has 27.5 miles and Western Pipeline, Inc., 46.6 miles of the 94.6-mile, 34-in. looping on the San Juan line. The remainder has not been let. The project is to be finished April 1, 1958.

Two other major projects are pending before FPC: 176.8 miles of 20-in. between Sonora and Plains in West Texas, and 192.8 miles of 30-in. loops on the Permian-San Juan crossover line. The 20-in. is planned for completion next July 1, the 30-in. by September 1, 1958.

East Ohio Gas Co. will complete a 112-mile construction program next week. Sharman, Allen, Gay & Taylor, the contractor, is winding up 89 miles of 24-in. and 23 miles of 30-in. along East Ohio's trunk line between Sarahsville and West Richfield, Ohio. A 4,500-hp. compressor station to increase deliveries from storage is being built at Doylestown, Ohio, by Hydrocarbon Construction Co. Completion date is January 1, 1958.

Peace River Oil Pipe Line Co., Ltd., is connecting its system to the Kabob area of Alberta. Engleking & James, Ltd., Edmonton, is laying 13 miles of 8-in. and 2 miles of 4-in., to be completed next week. The project will join the 12-in. trunk system near Fox Creek on the Valleyview-Edson main line.

Northwestern Utilities, Ltd., Edmonton, plans to build a 72-mile, 16-in. gas line from Pembina field to the Edmonton area next year. Tentative approval for the $3,500,000 project has been received from the Alberta Oil & Gas Conservation Board, which asked for a later report to be filed on an alternate route. Alberta Gas Trunk Line Co., Ltd., set up by the Alberta Legislature to control gas movement, said it would not oppose the line. But it insisted on a 10-year option to buy the line, to which Northwestern objected strongly.

Four Corners Pipe Line Co. has let a contract to R. H. Fulton & Co., Lubbock, Tex., for the remaining 70 miles of a 100-mile section previously awarded to Cape Construction Co. The section is located between Seligman, Ariz., and the Colorado River near Needles, Calif. Fulton already had 315 miles of the 635-mile main line from Aneth field in Utah to Los Angeles. The project is to be completed in January.

Michigan Wisconsin Pipe Line Co. plans to lay 148 miles of pipe during next year. The bulk of construction will be to connect new gas supplies in Laverne field, northwestern Oklahoma. The company will lay 33 miles of 4 and 6-in., 7 miles of 8-in., 4 miles of 10-in., and 2 miles of 12-in. in the field. A 56.2-mile, 20-in. extension will be built from its main line to the field.

In addition Michigan Wisconsin plans 25.3 miles of 12-in. and 20.5 miles of 24-in. loops on its system in Wisconsin and Michigan. This program is now before the Federal Power Commission.

North-West Oil Pipeline Co. has awarded a contract to W. M. Lyles, Avenal, Calif., and two German steel companies for a 230-mile, 28-in. crude line from Wilhelmshaven to Cologne. Construction is to start early next year with completion in November 1958.

Also for Pipeliners . . .

IN THE NEWS: Texas offshore gas moves to market for first time (p. 61) . . . FPC's time-killing red tape is hamstringing Colorado Interstate and posing a problem for the entire industry (p. 66) . . . FPC trims some details from its report form (p. 68) . . . Independents lose another round in suit testing FPC authority over unintegrated gas producers (p. 69) . . . Trans-Canada will pump gas at both ends of its line by winter (p. 72) . . . Producers sell more gas at better price in 1956 (p. 74) . . . Little Inch ready for conversion but is waiting FPC final action (p. 76) . . . Bolivia gives go-ahead for Andean crude line to Pacific Coast (p. 78) . . . Tapline moves record oil flow to Sidon (p. 79).

PLUS THESE TECHNICAL REPORTS: New chemical method cleans old crude lines for field-products service (p. 82) . . . Pipeline construction report (p. 125).

BA Well Beats Canada's Depth Record

CANADA'S 15-year-old depth record has been broken by a British American Oil Co., Ltd., well reported now at 15,000 ft.

The wildcat (see photo) is the 6-4 Lambert Creek, located in Alberta's central foothills 55 miles northeast of Jasper and 145 miles west and slightly south of Edmonton. An Arrow Drilling Co. rig established the mark, previously held by the Owen Development Co.'s 1 Hillsborough offshore from Prince Edward Island. The 1 Hillsborough went to 14,696 ft. in 1942.

The new record holder was spudded January 24 and blew out near the 13,000-ft. level. It was brought under control with little damage done and tested at rates up to 11 million cubic feet daily. The blowout was in the D1 zone of Devonian. Later it moved into the D2 section and headed for D3 (OGJ, Nov. 18, p. 373).

Producer Gas Sales Increase

. . . from 5.5 trillion to 6.1 trillion cubic feet in 1956. Price also goes up from 10.6 to 11.3 cents per M.c.f.

INDEPENDENT PRODUCERS receeived an average price of 11.3 cents per 1,000 cu. ft. for the gas they sold to interstate pipelines last year.

The independents sold more than 6.1 trillion cubic feet during 1956, for which they received $698.5 million, the Federal Power Commission figures.

Reports filed by the pipelines showed that they sold a total of 7.3 trillion cubic feet of gas in 1956. Gas bought from independent producers accounted for 85 per cent of it.

An FPC report released last week shows that the average price of independent gas last year was 0.7 cent per 1,000 cu. ft. more than in 1955. Total sales to the pipelines were 6 billion feet greater than the 5.5 trillion reported for 1955.

Direct purchases of gas were made from 4,948 producers in 21 states in 1956. Twenty-eight producers, alone or as the first named in combination with others, supplied some 60 per cent of the total. About 3 per cent of the producers, or 130, accounted for more than 85 per cent. Producers with sales of 2 billion cubic feet or more constituted 5.2 per cent of all producers, supplied 91.5 per cent of the gas, and received 90.8 per cent of the revenues.

More than 92 per cent of the gas bought by the pipelines last year came from the five southwestern states. Texas supplied 50.4 per cent; Louisiana 23.5 per cent; Kansas 7.1 per cent; New Mexico 6.4 per cent; and Oklahoma, 5.1 per cent.

Sales of Texas gas brought a total of $324.5 million, or 46.4 per cent of the total revenues. Louisiana producers received $180.7 million, or 25.9 per cent.

The range of average prices ran from 30.1 cents per 1,000 cu. ft. in New York to 6.4 cents in Montana. The average in Texas was 10.4 cents. But in Louisiana it was 12.5 cents.

The FPC report shows that in addition to the gas bought from independent producers, the interstate pipeline companies produced 806.6 billion cubic feet themselves. They also bought 10.9 billion cubic feet of manufactured gas or LPG, and reported receipts in excess of deliveries of 16.5 billion cubic feet of gas.

Total service rendered by the pipelines involved nearly 7 trillion cubic feet of natural gas and 10.9 billion cubic feet of other gas produced in 1956.

Pembina LPG Flood

is first big miscible-phase project for Canada. Water will follow propane, gas.

CANADA'S FIRST LPG flood is under way in the Cardium sand near the center of Alberta's huge Pembina field.

Canadian Bishop Oil, Ltd., is injecting propane in three input wells on a 1,920-acre block in an attempt to increase ultimate recovery by using the new miscible-phase displacement method.

Similar programs have already been launched this year in a number of fields in Texas, Oklahoma, New Mexico, and California, but this is the first one of major significance for Canada.

The company will inject 24,000 bbl. of propane into each of three input wells. This will be followed in about 5 weeks by injection of 5,000 M.c.f. of natural gas daily.

Five input wells have been drilled for injection of water at a later date. Canadian Bishop will not speculate on results expected from the new secondary-recovery program.

Cooperating in the project are McColl-Frontenac Oil Co., Ltd., and Luscar Coal Co., each of which own one-half section of the flood area, which takes in a strip 3 miles long and 1 mile wide.

Big reserves . . . Pembina field production was first found in Cardium pay at 5,120 ft. in 1953. Since then the field has spread to about 400,000 acres—one of the largest pools on the continent.

Primary reserves for Pembina are

estimated at about 1 billion barrels of oil. The field has already produced 79,197,000 bbl.

Pembina is a stratigraphic trap with solution-gas drive. Several water-flood projects are operating in other parts of the field.

Subsidence Plan

adopted by Long Beach, calling for voluntary agreement by oil operators.

THE LONG BEACH City Council will reluctantly recommend that the California Legislature adopt a voluntary rather than a compulsory plan to halt subsidence at Long Beach.

The council, after a lengthy dispute, voted 5-0 to present the recommendation to the state interim committee on subsidence legislation when it meets in Long Beach December 9-10.

The plan would empower the state oil and gas supervisor to administer unitization and repressuring programs in Wilmington field. The supervisor would be required to promote voluntary agreements wherever possible.

This legislative proposal was adopted rather than an alternate plan calling for establishment of a subsidence abatement district with compulsory unitization features.

The council made the decision with considerable reluctance because it was felt that the compulsory program would give the city more control over the program of halting subsidence. But three leading state legislators warned the council that their only hope of getting anything done at the next legislative session was in sponsoring the supervisor plan.

There is some doubt whether the proposal will be submitted to the next session in 1958, since next year's session is for budgetary purposes only. Before any other legislative matters can be considered, a special call must be made by the governor.

But the Long Beach Chamber of Commerce and the Naval Shipyard Employes Association are pressing for antisubsidence legislation. The two groups are circulating "Save Our City from Sinking" petitions which they hope will result in a special legislative call from the governor.

Earlier this month it was reported that Navy officials asked the Justice Department to explore the possibility of filing damage suits against operators at Wilmington where subsidence has caused multimillion dollar damage to the huge Long Beach naval base.

Proration Due San Juan Basin

. . . beginning in December. New Mexico commission sets 28-bbl. temporary allowable. It'll be more later.

NEW MEXICO will have two sets of allowable for its oil fields starting December 1.

The state's conservation commission issued an order last week prorating production in the San Juan basin. It fixed a maximum allowable of 868 bbl. per well for the basin during December. That averages 28 bbl. daily for the 31-day month.

The commission provided, however, that operators can overproduce up to 50 per cent if higher production becomes necessary to serve the Four Corners pipeline.

Operators who do take the extra allowable will have to deduct the volumes produced from the amount they can produce when the commission adopts a formal proration schedule for the basin, Commission Engineer Dan Nutter said.

Allowables will be set for these northwest New Mexico fields without considering the proration system for older production in southeastern New Mexico, where wells have an allowable of 37 bbl. daily for December.

"The two areas have entirely different markets and are not in competition in any way," Nutter said.

The only market for northwest New Mexico crude in the near future will be through Four Corners Pipe Line to the West Coast. Crude in the southeastern part of the state moves in the opposite direction.

In the past there has been only one common purchaser—El Paso Natural Gas Co.—for the San Juan basin oil.

But now both Shell Oil Co. and Gulf Oil Corp. have entered the San Juan basin market and both are making nominations. Nutter said this development makes proration necessary to assure equitable take from all wells.

Good-Faith Ruling Expected

. . . from U. S. Supreme Court soon. It is again considering a decision in the 17-year-old Standard of Indiana suit.

THE DECISION of the court could call for marked changes in pricing policy of the oil industry.

The immediate question before the court is: Did Standard Oil Co. (Ind.) cut prices to selected customers more than 17 years ago in good faith to meet competition? Or did it, as now charged by the Government, merely follow a long-standing pricing policy allegedly illegal under the Robinson-Patman Act?

The Federal Trade Commission raised the good-faith issue in 1940. It charged that Standard had violated the anti-price discrimination clause by granting tank-car prices to certain Detroit jobbers because they also sold at retail in competition with dealers who had to pay the tank-wagon price.

The Supreme Court held in 1951 that Standard had acted in good faith to meet competition. It sent the order back to the FTC for revision. The commission issued a new order 2 years later.

Illegal pricing argued . . . The second order was argued before the high court last week. But the Government this time submerged the good-faith issue in favor of an attack on what it claimed was an illegal pricing policy.

Government lawyers told the court that it would virtually nullify the price discrimination law if it now upheld Standard's claim.

They argued that the company had followed a policy of price discrimination in effect even before the passage of the Robinson-Patman Act. If allowed by the court order to continue this policy, other suppliers could do the same thing and the law would be made ineffective, they claimed.

Counsel for Standard, however, asserted the company's good faith in meeting competition was the only issue. The "pricing system" was not involved, Hammond Chaffetz, attorney for Standard, declared.

Chaffetz told the court that it was necessary for Standard to meet lower prices offered by competitors if it was to retain the jobber customers involved. He said the FTC, itself, had agreed that this was the case.

Members of the court were not amused at having the 17-year-old case before them for the second time. They asked pointed questions about delays which kept the matter alive so long.

Texas Proration to End

. . . in December if Gulf takes its full allowable. Twelve-day production approved. New attack on majors brews.

TEXAS crude producers are hopeful that December will see the end of pipeline proration—at least for a while.

Gulf Oil Corp., only buyer now prorating in the state, indicated at the monthly statewide hearing it will be able to take the full December allowable, provided the allowable were set no higher than 12 days.

The Texas Railroad Commission forthwith set the allowable at 12 days —the all-time low figure first adopted for October and retained for November.

Because of the additional calendar day in December, the action means a slash of 53,671 bbl. daily from the allowable set November 2 and 11,512 bbl. from the figure initially set for November. The December total will be 2,987,415 bbl. daily.

The 12-day schedule for December was, on the average, just what the crude buyers wanted. Seven of the major purchasers asked for 12 days, two sought 11, and two 13. Wanting the lower allowables were Magnolia Petroleum Co. and Sun Oil Co. Sinclair Oil & Gas Co. and Shell Oil Co. were on the high side.

Trouble in Panhandle . . . Despite the expected end of pipeline prorating, it appears the majors soon may come under still another attack from Texas independents who want bigger buying.

Early this year five independent-producer associations petitioned the commission to order common-carrier pipelines to extend gathering systems and expand capacities and thus be able to hook up more than 8,000 unconnected wells in the state. This scrap has not been resolved, and the pipeline companies are preparing to file reply briefs with the commission early in December. It is likely the same producer group will carry the issue into the courts.

In a new development, the independents have asked the commission to order oil purchasing from a field in the Panhandle currently without a market.

B. M. Brittain, attorney for Baker & Taylor Drilling Co. and for M. A. Machris, said the market for production for his clients' five wells in Paul Hargill field of Ochiltree County had been cut off since July.

The production prior to this had been trucked by Cactus Petroleum Co. to Shamrock Oil & Gas Corp. Shamrock quit buying it on completion of the Emerald Pipeline.

The producers, Brittain told the commission, have made an offer to all pipelines and refineries to truck the oil anywhere in the area, but there have been no takers.

He asked the commission to set a hearing, find discrimination under the Texas common-purchaser act, and order purchase of the oil. There are some hints the state producer association may join Baker & Taylor and Machris in proceedings before the commission or the courts.

Sore spot removed . . . Meanwhile, the commission found that another hardship case has been relieved.

Producers in Brown & Thorp field are selling their oil. The oil is taken by Crown Central Petroleum Corp., and Cactus Petroleum is acting as intermediary on a month-to-month basis. At the October 17 commission hearing, independent C. W. Brown said 77 wells in the field would have to be shut in November 1 because Crown Central had cut off purchases.

Allowable by Districts

District—	Dec.	Change from Nov. 2
1 Southwest Texas	62,045	—482
2 Texas Gulf Coast	125,849	—3,661
3 Texas Gulf Coast	420,601	—8,076
4 Southwest Texas	207,621	—3,588
5 East Cent. Texas	35,587	—581
6 Outside E. Tex. field	123,428	—2,994
6 East Texas field	162,721	—4,191
7-B North Cent. Texas	165,122	—3,890
7-C West. Cent. Texas	161,578	—3,235
8 West Texas	1,100,366	—21,373
9 North Texas	285,133	—2,462
10 Panhandle	137,364	+862
Total	**2,987,415**	**—53,671**

Little Inch Ready, but Waiting

. . . for FPC to appeal court ruling or follow mandate by getting examiner's report. FPC action is expected soon.

THE FAMED LITTLE BIG INCH pipeline is ready now to take its first products—but a legal technicality may keep it idle for months.

Texas Eastern Transmission Corp., which spent at least $35 million to convert the line from gas to products service, is barred from operating it by an order of an Appeals Court in Washington.

The court held that the Federal Power Commission erred in approving retirement of the line from gas service. FPC had skipped hearing the usual examiner's report before making a decision.

The court ordered FPC to reopen the proceeding and correct the omission.

The ruling may delay startup of the product pipeline by a few weeks or as much as 3 or 4 months. The length of time depends on what action FPC takes, and how quickly.

Courses open . . . Texas Eastern officials look for FPC action soon—possibly within a week or two. They point out the agency recognized a year ago that court-enforced delays in getting the line operating were working a hardship on the company.

As Texas Eastern sees it, FPC can follow one of two courses. It can:

. . . Appeal the Appeals Court ruling to the Supreme Court. If FPC does this, Texas Eastern immediately will petition the Appeals Court to permit operation of the Little Big Inch pending outcome of the appeal. With this set of circumstances, the company conceivably could begin operating the line within the next few weeks.

. . . Follow the Appeals Court mandate. This could mean a longer delay in getting the line in operation, although no further hearings would likely by held by FPC on the project. The testimony already is in the record, and FPC probably would direct one of its examiners to review the evidence and make an advisory decision. The commission then would review the decision and issue one of its own.

Until FPC acts, however, the line cannot operate.

Despite the delays, the Little Big Inch conversion, when it finally comes off, will be the biggest event in product pipelining since the 20-in. line was built originally as a product pipeline in 1943-44 to serve as companion to the Big Inch crude line. Later it was converted to gas.

The line will carry products distances up to 1,168 miles—from Baytown, Tex., on the Gulf Coast to Moundsville, W. Va.

Alberta Gas Found

for third time in Waterton Park area. It's Texaco well

TEXACO EXPLORATION CO. has tapped a third new gas reservoir in the Waterton Park area of southwestern Alberta.

The latest find is Texaco A6-15-5-2w5 Gladstone Creek, 7 miles northwest of Shell Oil Co.'s recent Waterton Park discovery and 3¾ miles southeast of Texaco's recent Castle River discovery (see map). All three produce from the Mississippian.

At the new Gladstone Creek well, operators ran a drill-strem test on a 144-ft. interval at about 11,475 ft. Gas rose to the surface at the rate of 2,400 M.c.f. per day. Pipe recovery was 90 ft. of distillate.

All three of the Mississippian wet-gas discoveries lie along the Rocky Mountain front, north of the U.S. border and slightly northwest of Pincher Creek gas field.

Helium Plant Studied

RUSSIA'S SPUTNIKS may spur government officials to take a new look at helium.

A broad expansion of the Government's helium program to provide gas for the speeded-up missile and satellite programs is reportedly under study by the Interior and Defense departments.

The reported plans call for the building of another helium plant for the Bureau of Mines at a cost of $14 million. The plant would extract helium from natural gas before it is sold to pipelines.

There's belief in some quarters that Russia may have used helium in getting its sputniks into orbit. This had led to speculation that the Soviets may have found helium reserves of their own. Nearly all of the free world's helium is produced in four U.S. plants.

Processing briefs

Vladimir Haensel, UOP's director of refining research, has been named winner of the 1957 Professional Progress Award in Chemical Engineering by the AICHE. The award, sponsored by Celanese Corp. of America, will be presented in Chicago December 10 at the group's annual meeting. Haensel joined UOP in 1937 and since has been associated with many of the company's technical developments.

Shell Chemical Corp. is considering building a plastic raw materials plant near Riverside, N. J., across the Delaware River from North Philadelphia.

Standard Oil Co. of California has started engineering work on a $2,000,000 steam generating plant at its El Segundo, Calif., refinery. The plant, to be installed as part of an existing catalytic cracking unit, will burn both natural gas and cat regenerator flue gas as fuel. Fluor Corp., Ltd., will engineer and build the 275,000-lb. per hour plant. Construction schedule calls for it to be started next August and completed in March 1959.

Arkansas Louisiana Gas Co. plans to build a $3-million hydrocarbon extraction plant at Magnolia, Ark. The plant would extract 78,000 gal. of ethane daily for marketing to the plastics industry. LPG would be sold to wholesalers. The new facility, to be located near two gas pipelines, is scheduled for completion in mid-1959.

Goodyear Tire & Rubber Co. has completed a $2,750,000 expansion program at its synthetic latex plant in Akron, Ohio, boosting production by 50 per cent to 27,500 tons annually. This makes it the world's largest synthetic plant devoted exclusively to the production of high solids latex.

The expansion includes 10 new reactors, each with a capacity of 3,750 gal.; two butadiene and two styrene recovery columns; a 200 per cent increase in latex storage facilities; and new water-pumping facilities capable of circulating 20,000 gal. of water per minute.

The National Federation of Chemical Workers of Canada will decide at a special convention in Montreal December 7-8 whether to affiliate with the Oil, Chemical, and Atomic Workers International Union. The two unions have negotiated on the merger plans, and a Labor Unity Committee has recommended the step be taken. The NFCW represents approximately 4,500 workers in 13 bargaining units in Quebec.

Shell Chemical Corp.'s refinery at Norco, La., has started initial testing and preliminary operation of its new hydrogen peroxide and secondary butyl alcohol units. Construction of the hydrogen peroxide unit began in mid-1956 after pilot plant operations proved the process successful. Paper and textile industries will use the product as a bleaching agent.

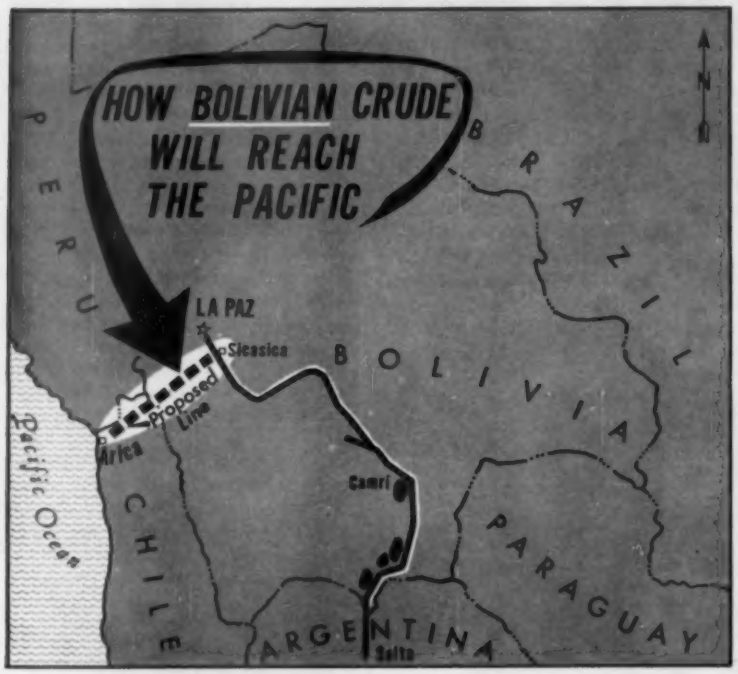
Construction of the secondary butyl alcohol unit started last January. The unit is designed to produce 40 million pounds of SBA per year for use at the Shell Chemical Houston plant as an intermediate in producing methyl-ethyl ketone for paint and lacquer industries.

Pile-driving operations start this month on a deep-water pier not far from The Texas Co.'s 40,000-bbl. refinery now under construction at Anacortes, Wash. The pier will be in water 50 ft. deep. It will be able to handle a supertanker and a smaller tanker simultaneously. It will be 5,600 ft. long and have an additional 1,200-ft. L-head at the end. The location is 2½ miles from the refinery. Completion is set for early 1959.

Also for Refiners . . .

IN THE NEWS: Petrochemical production will double by 1965 when petroleum's share of the total chemical output will be 40 per cent (p. 59) . . . Better use of engineers is advocated as stop-gap approach to present shortage (p. 63) . . . Imports drop by 15,500 bbl. daily in October to put the control program on target (p. 64) . . . Television keeps a constant watch on boiler flame at Humble's Baytown refinery (p. 70) . . . Celanese is using a new process for making acrylate esters (p. 71) . . . Esso agrees to furnish crude for Greece's new refinery (p. 79).

PLUS THESE TECHNICAL REPORTS: Unhoused compressor plant for an ammonia unit (p. 85) . . . Premium motor fuel from gilsonite (p. 98) . . . Spivey gasoline plant features automatic shutdown and alarm system (p. 102) . . . Refinery construction survey (p. 117).



Andean Oil Line Ordered

. . . from Sicasica in Bolivia to Arica on Chilean coast. Gulf foots half of the costs of $10-million project, which is seen as major boost to Bolivia's economy.

THE BOLIVIAN Government has given the go-ahead for construction of a 217-mile crude line to provide a valuable export outlet to the Pacific.

The 8 and 10-in. line will extend from Sicasica, Bolivia, on the present system from Camiri field, to Arica, on the Chilean coast (see map).

Yacimientos Petroliferos Fiscales Bolivianos (YPFB), the government oil agency, signed a contract with Williams Brothers, Tulsa constructors, 2 years ago. Now YPFB has exercised its option under the agreement and instructed the contractor to proceed.

Construction will start in March. The line is scheduled to be ready for operation in October 1958. Half the $10-million construction cost is being financed by Bolivian Gulf Oil Co. under its concession agreement (OGJ, Apr. 2, 1956, p. 91).

The 6,000-bbl. per day export outlet will be a major stimulus to Bolivia's economy.

Badly in need of foreign exchange, Bolivia now will be able to cash in on its success at developing oil production beyond domestic needs of 6,000 to 8,000 bbl. per day. The line has been in the works for about 3 years, ever since productive capacity outstripped domestic demand.

Bolivia now exports some crude to Argentina. Gasoline is exported to Paraguay, Brazil, and Peru. In refining enough heavy fuel for domestic needs, Bolivia produces surplus gasoline because the light crude has a low yield of fuel oil. Crude exports to Paraguay will start when another line now under contract has been built.

Further development . . . YPFB expects the exports to Arica to be only a start.

A new law has opened the country to foreign development, and several American companies have taken advantage of it.

Bolivian Gulf, owned by Gulf Oil Corp., Falcon Seaboard Drilling Co., Williams Brothers, and Barry & Reiner, Inc., Tulsa, is drilling in Bolivia. So is Chaco Petroleum, S.A. Other companies have preliminary exploration under way. YPFB is continuing with its own stepped-up development in the Camiri area.

In anticipation of increased production, Williams Brothers designed the new pipeline to permit expansion up to 50,000 bbl. per day.

Line details . . . The Sicasica-Arica line will be unusual in some respects.

It will drop from 15,000 ft. elevation to sea level in the last 48 miles on the west slope of the Andes. This is the section that will be 8 in. in diameter. For 155 miles of its length the line will be 13,000 to 15,000 ft. above sea level. On the sharp drop down to Arica, where a marine terminal will be located, four pressure-reducing stations are planned. This is the first line ever laid which required pressure reduction in four steps.

Without these stations, pressure would theoretically build up to 14,000 psi. The contractor said the oil flow could drive turbines to generate enough power to supply Arica's 30,000 population, but power generation is not planned at this time.

On the Andes slope pipe will be buried deeper than usual to offset its tendency to crawl downhill. Restraining anchors also will help hold it in place.

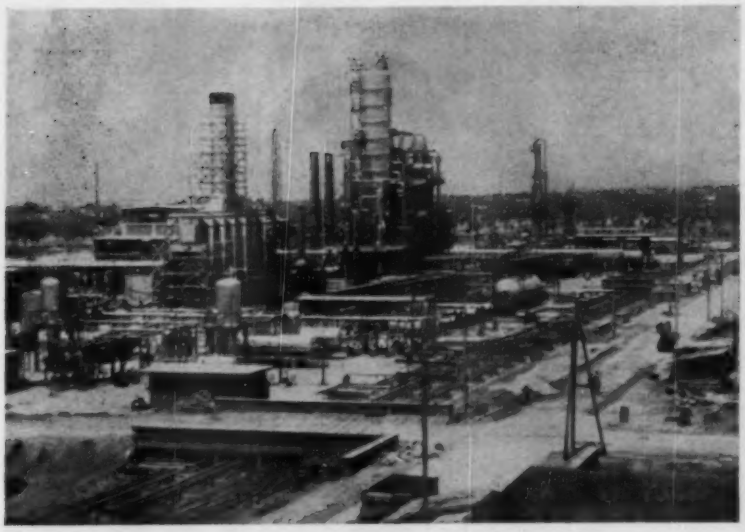
The corrosive action of salt is a problem on the altiplano, the Andes plateau which the line crosses.

Chile May Change Oil Law

OIL LEGISLATION long pending before Chile's parliament has been changed to allow oil concessions to companies already operating in the country.

Reports from Santiago last week said the House of Deputies mining committee has made the changes. In effect this would allow private oil exploration by several of the major companies which have marketing operations in the country. Exploration is now exclusively in the hands of Empresa Nacional de Petroleos (ENAP), the government company.

The revised oil bill would allow ENAP to grant subconcessions limited to 10,000,000 hectares (about 2,470,000 acres).



New 30,000-bbl. plant gears for action after . . .

Greece Makes Deal with Esso

ESSO EXPORT Corp. will furnish Middle East crude for Greece's new 30,000-bbl. daily refinery.

The Standard Oil Co. (N. J.) affiliate has also agreed to furnish technical help and assistance for the first 2 years of operation to Elbyn, the Greek corporation which got the nod from the government to operate the new plant.

The Greek Government gave Elbyn and several associates a 10-year operating contract on the condition that Esso would furnish the crude and give technical assistance. The refinery has been completed for several weeks, but has not gone on stream pending a decision on who would operate it.

The plant was built by Hydrocarbon Research, Inc., New York; its German subsidiary, Hydrocarbon Mineralol, Dusseldorg; and the German companies, Friedrich Krupp Maschinen and Stahlunion Export. Construction was supervised by George Armistead & Co., Washington, D. C., consulting engineers and technical advisors to the Greek Government.

The refinery was designed to operate on typical Middle East crudes in the 34°-35°-gravity range. In addition to the 30,000-bbl. per stream day distillation unit, it has a vacuum distillation unit, an 8,200-bbl. Catformer, and an asphalt blower designed for a 500-bbl. charge.

Product output will include motor gasoline, jet fuels, kerosine, diesel fuels, two grades of residual, and asphalt.

The refinery is located a Aspropygros, a short distance from Athens. The crude supply terminal and tankage is at Megara on the Bay of Eleusis. The refinery and terminal are linked by a 14-mile, 12-in. pipeline.

Delhi Set for Panama Drilling

PANAMANIAN DELHI PETROLERA, Inc., plans to kick off active exploration of its 1,660,000-acre concession in Panama the first week in December.

The company, a newly formed Panamanian affiliate of Delhi-Taylor Oil Corp., Dallas, will spud its first stratigraphic test—one of 250 it plans to drill to depths of 800 to 1,800 ft. over the concession within the next 18-24 months.

The Delhi-Taylor concession acreage is located in Darien province in extreme eastern Panama near the Colombia border. It is split in two blocks. The largest touches on the Colombian border and takes in roughly 1,300,000 inland acres. The second block is near the Pacific Coast and includes some submerged acreage in the Gulf of San Miguel.

Delhi-Taylor plans to concentrate its exploration effort during the first few years on the larger block. It has set up a general headquarters office in Panama City and a main base camp at El Real in Darien. The first jungle exploration camp now is being established about 35 miles up the Chucunaque River from El Real.

The small strat rig will be mounted on a shallow-draft boat and moved up the river adjacent to drilling locations. A bulldozer will be used to move the rig off the boat and onto location.

The company plans to ship a second, slightly larger rig into the area to join the first in the next 3 or 4 months.

The operation during the next 18 months will require a crew of about 75, including engineers, geologists, surveyors, and brush and drilling crews.

Delhi will supplement its strat work with some surface and seismic exploration and probably aerial magnetometer surveys. Extensive seismic work is prohibitive from the cost standpoint due to extremely dense jungle.

The company thinks it should have found sufficient structures from this work to justify bringing in a big rig within the next 2 years.

Tapline Output Up

at Lebanon terminal. Pump units give Middle-East line big gain; more coming.

TRANS-ARABIAN Pipe Line Co. delivered a remarkable 394,400 bbl. daily from its Sidon, Lebanon, terminal in October for a new all-time record.

Some of the gain over the 10-month average of 344,400 bbl. daily was due to normal changes in inventory. But the biggest reason for the high level was the new turbine pumping units. Half-a-dozen were putting their muscle into the system during all or part of the month.

Tapline had four of the turbines operating on its 754-mile section. Three were auxiliary units at intermediate stations spotted between existing stations in Saudi Arabia. The fourth was installed as a permanent unit at Qaryatain, Jordan. This is the first permanent pumping station installed by Tapline outside Saudi Arabia.

Arabian American Oil Co. had two units in operation on its 315-mile section of the 30-31-in. system.

Three final units will be available by January 1. Two will be installed at an existing station in Saudi Arabia, 574-IF. The third will be a portable auxiliary. It will be used as a spare.

The combustion-gas turbines are the key to an expansion program raising capacity to 435,000 bbl. daily.

A Dutch idea with Latin improvisations is a winning combination as . . .

Shell-Condor Tames Wild Magdalena

WHAT DO YOU do when you've got a promising oil field with a fickle, erratic, sometimes rampaging, and always changing river running through it?

That's the problem facing Concessionaria de Petroleo Shell-Condor, S.A., in Colombia's Magdalena River Valley.

Shell-Condor discovered Yarigui field in 1954. The discovery well was on the east bank of the Magdalena. The second well, Yarigui 2, was across the main river channel and only a stone's throw from Cantagallo field. Both these tests were directional wells. They proved to the satisfaction of almost everyone that Shell-Condor had a field under the river.

The river is filled with islands and sand banks. They look perfect as drilling sites to develop the field. But, there's a hitch.

At this point the Magdalena varies from 1 to 2 miles in width. The depth in the deepest channels ranges from 23 ft. at low water to 33 ft. at flood level. Two wet and two dry seasons each year vary the speed of the current from 3 to 8 knots. This alternate flooding and drying up does some pretty strange things to those islands and sand bars. Sometimes they're there; sometimes they wind up downstream. Not much of a site for an expensive oil well.

One of the river islands, Isla Conyugal, appears on some old maps. Its tall trees were pretty good evidence that it had been there a long time and probably would stay put. Shell-Condor spudded its third Yarigui well on the island, 150 ft. from the east edge of the island and 500 ft. from the west edge.

The river began to act up almost immediately with a fast change of current that started eating away at the shore. The company retaliated with a palisade of old pipe to form a barricade between the drilling well and the swirling water. When the water reached the pipe it began to leach out the earth behind it and work its way slowly but surely toward the well.

A lot of other methods were considered to control the water and safeguard drilling operations, but all were either too expensive or proved to be impractical.

But Shell-Condor doesn't have a Dutch heritage for nothing. A device so old that it seems primitive, but so well proved in the Netherlands that it rated a try, is proving to be effective. Known as a "Dutch mat," the device is the backbone of even the recent dyke systems built in the Netherlands. All it needed was a little Colombian improvisation.

Here's how it works . . . Armed with nothing more mechanical than the tools they know best, the machete, Colombian laborers cut brush and bundled it together to form rafts about 50 by 80 ft. and about 2 ft. thick. These were pegged to the eroding bank and then covered with a layer of rock—about half a ton to the square yard. This was topped by a layer of gravel to give the whole thing a fairly smooth surface.

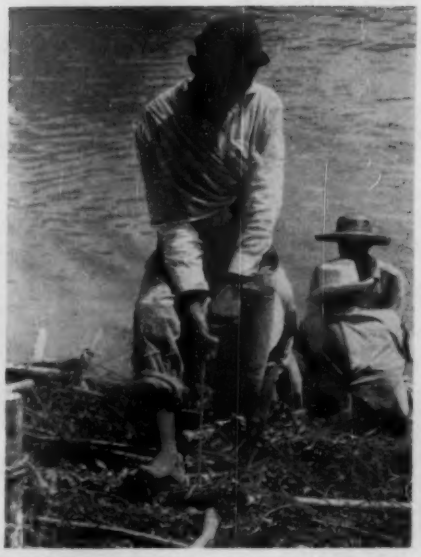
The entire length of the mat that extends into the water is sunk with rock and held close against the bottom and sloping side of the bank.

Shell-Condor finds that it not only works, but has a number of advantages over other types of bank protection that might have been used. Here are some of them:

. . . The flexible mats shape themselves to the underlying river bank preventing future washouts.

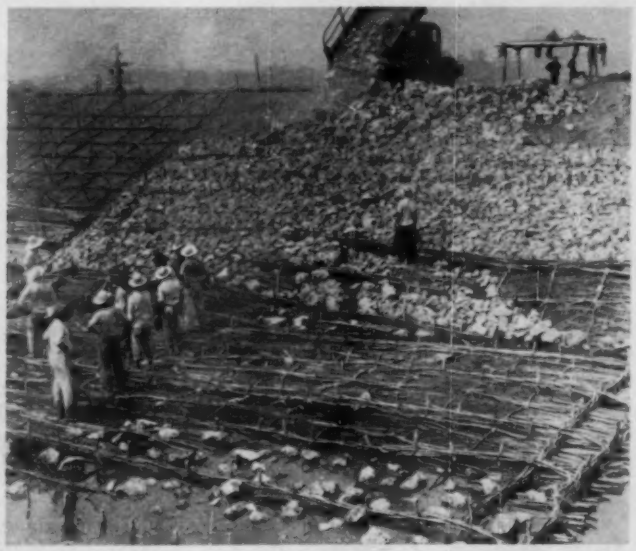
Latin recipe for "Dutch mats":

1 Small trees are the main ingredient. In Colombia, plenty of natives with sharp machetes were used. They cut pegs for the mat.



2 The trees are lashed together on the bank of the river.

3 As the mat takes shape, it is anchored to the river bank.



4 When the mat is completed, rocks and gravel are added to give it weight.

. . . **Repairs are made easily** by simply dumping more rock on any weakened areas.

. . . **All materials are cheap** because they are readily available at or very near the location.

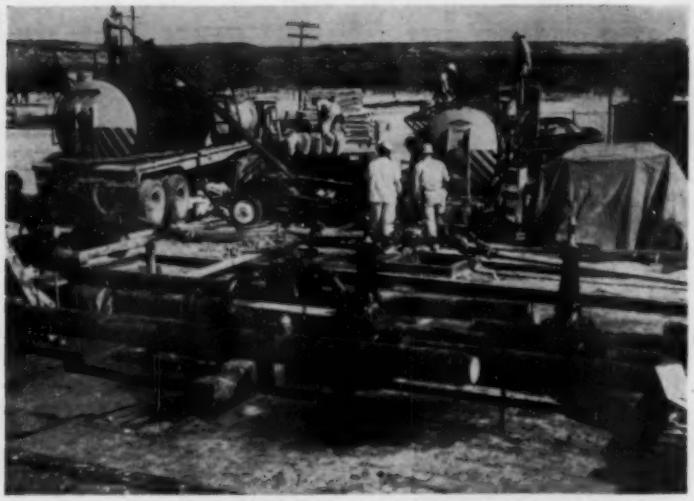
. . . **Building the mats** is easily understood by the Colombian workman who got the swing of the thing almost immediately and did most of the job with nothing more than shovels, machetes, and sledges.

The results . . . Yarigui 3 is not only safe from the changing river, but others have been waterproofed in the same way.

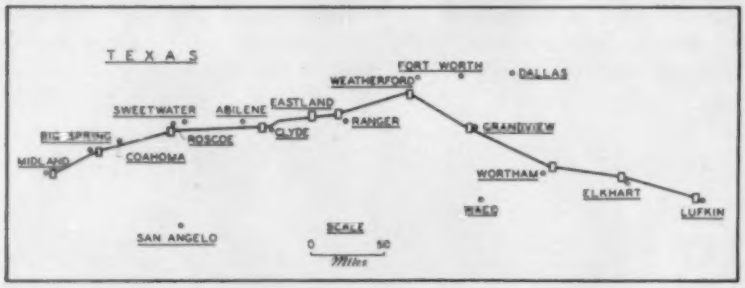
Less than a mile south of Yarigui 3 and on the same island, a group of three more wells, 5, 6, and 7, have been slant-drilled to about 8,200 ft. with deviations of from 2,300 to 3,100 ft. from the vertical. No. 6, another well, had to be abandoned because of hole trouble, but Nos. 5 and 7 were completed as producers. The wells average better than 1,100 bbl. daily of 20.6°-gravity naphthenic crude from the Tertiary sand pays.

Shell - Condor's development program calls for continued drilling both on Isla Conyugal and other islands in the river. In almost every case the drill sites will have deviated wells in groups. In every case the shifting Magdalena River is going to run into — — Dutch mats.

Old Crude Line Gets A Cleaning



1 CHEMICALS were pumped from injection point here through 44.5-mile test section.



Alkaline and acid treatment cleaned the line quickly, economically, and effectively

. . . for field products service

By J. F. Stephenson, H. E. Waldrip, and H. B. Green

A NEW METHOD of chemically cleaning the interior of crude-oil pipelines now offers important savings in time and money to pipeline operators. This new process was recently used in converting a 474-mile crude-oil pipeline to field products service.

The line, laid in 1929, runs from Midland to Lufkin, Tex. (see map). It supplied West Texas crude for Gulf's Port Arthur refinery until 1952, when it was removed from crude-oil service. This line remained idle until 1956, when it was hydrostatically tested and repaired in preparation for cleaning, before conversion to natural-gas liquids service.

Deposits removed from the line were oils, greases, iron sulfides, and iron oxide. The two cleaning methods that have previously been used to remove such deposits are not entirely satisfactory. One of these is simply to put the line into refined-products service. When this procedure is used, products at the front end of each batch are so discolored and scale laden that they require further refining retreatment.

In addition, as long as 18 months may be required before refined products pass through a line without picking up some discoloration and scale. Therefore, this cleaning method is both expensive and inconvenient.

Detergent cleaning . . . The second method is to run water containing detergent through the line to clean out petroleum waxes. Pipeline operators have sucessfully removed waxes in this way. However, iron scale is not removed by the detergent and remains in the line, later to be washed free from the walls of the line and become suspended in the refined products. Some of these iron oxides are as finely divided as jeweler's rouge, discoloring oils and gasolines so that they have to be further treated.

In the case of one pipeline cleaned by a detergent, waxes were satisfactorily removed. However, the detergent did not remove the iron oxide scale. Scrapers inserted after the line was placed in service were stopped by the large amounts of residual scale. It was necessary to cut the scrapers out, at great expense and difficulty.

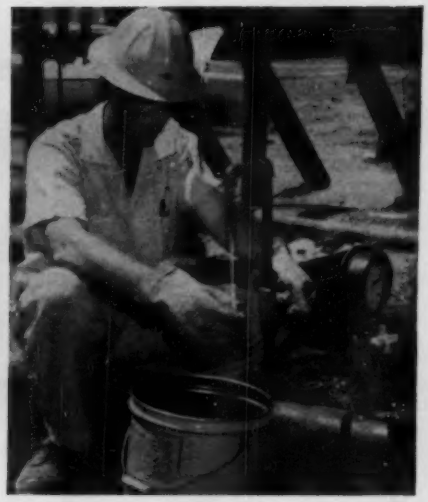
New Method Requirements

Because of the disadvantages of these methods, an entirely new cleaning procedure was devised by Gulf Refining Co., Gulf Oil Corp., and Dowell Incorporated engineers. Several requirements were set up for this new method. First, it should completely remove all deposits, including iron sulfide and iron oxide, from the line. Second, the method must be economical. Third, it must be a fairly rapid process.

Laboratory studies made by Gulf technical personnel revealed that the

Authors are with Gulf Refining Co., Gulf Oil Corp., and Dowell Incorporated, respectively.

2 DISPOSAL PIT was dug away from inhabited areas near Weatherford, Tex., to avoid fume hazards.



3 ACID SAMPLES were frequently taken at check points.

4 PROTECTIVE rubber clothing and running water guarded personnel handling scrapers at scraper traps.

5 FOULING by iron scale, oils, and greases before cleaning.

use of certain surfactants in combination with acid or basic solutions permitted the solution to penetrate the wax or scale film to the metal surface. They resulted in satisfactory cleaning. Without the use of the proper surfactant, cleaning was not satisfactory.

Treatment plan . . . Using these data, the treatment plan consisted of pumping the following chemical cleaning agents through the line:

1. Degreaser (alkaline solution containing a detergent)
2. Water flush
3. Descaler (inhibited hydrochloric acid containing a wetting agent)
4. Water flush
5. Descaler (inhibited hydrochloric acid containing a wetting agent)
6. Water flush
7. Neutralizing solution

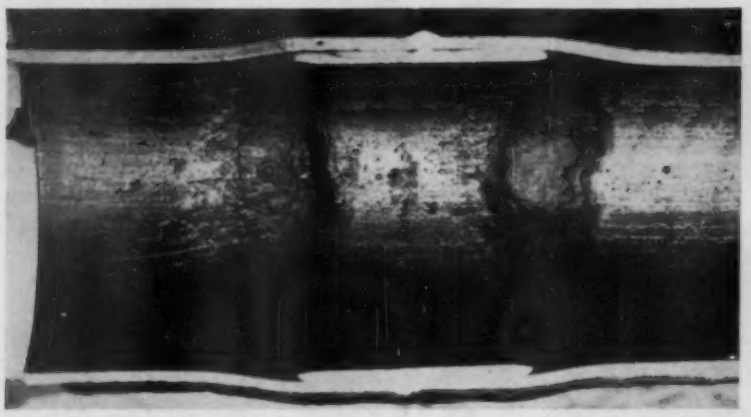
This new cleaning method was tested on a section of 8-in. and 10-in. pipeline running from Ranger, Tex., to the Weatherford, Tex., station, a total distance of 44.5 miles. The cleaning materials were injected at Ranger (Fig. 1). Pipe scrapers were inserted before and after each chemical stage, and at 100-bbl. intervals throughout the water and alkaline stages.

The 1,000-bbl. degreasing solution was injected at 350 g.p.m., with pipeline scrapers inserted every 100 bbl. The purpose of this solution was to remove organic deposits, leaving only the iron sulfide and iron oxide.

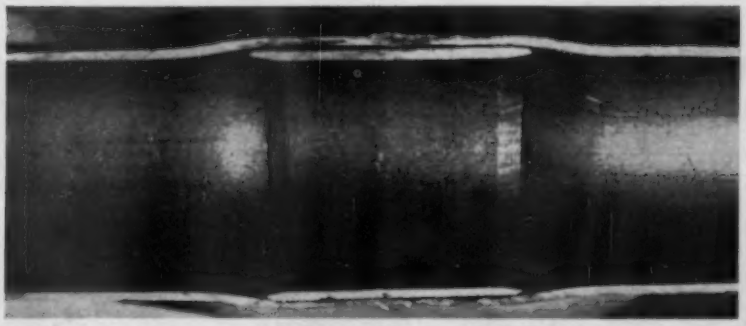
This was followed by 1,000 bbl. of flush water. Next 500 bbl. of descaling solution (inhibited hydrochloric acid containing a wetting agent) was pumped into the line. This acid was followed by a 1,000-bbl. fresh-water flush.

Another 500 bbl. of inhibited hydrochloric acid and wetting agent was then injected, and followed by a 1,000-bbl. fresh-water flush. This flush water was followed by 500 bbl. of a mild neutralizing solution. The cleaned line was displaced with inhibited passivated water in the interim

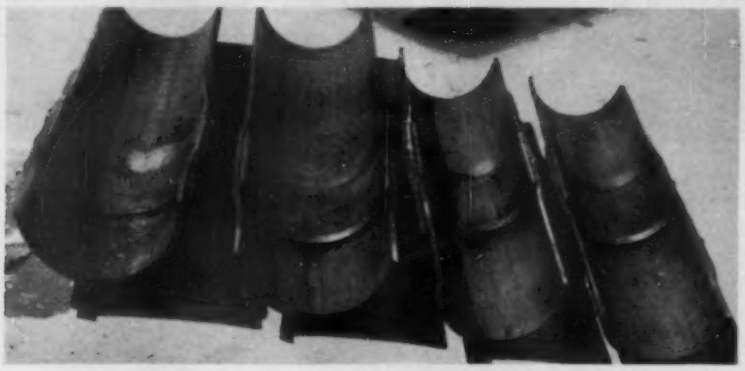
How pipe looked after it was cleaned



6 ALL DEPOSITS, even from pits, are cleaned from badly corroded bell joint.



7 LESS SEVERE corrosion had attacked this pipe specimen, now in good condition and thoroughly cleaned.



8 RESULTS OF CLEANING are shown on sections of pipe cut from both 8-in. and 10-in. lines.

before being placed in refined products service.

All chemicals were pumped into a 2,000-bbl. disposal pit, containing 15 yds. of limestone, at Weatherford (Fig. 2). Clean flush water was diverted to a pond.

Regular testing . . . Acid samples were tested regularly at the injection point and at other points along the line to be sure that all solutions were kept at proper strength. Additional materials were available for injection at these points if necessary. Fig. 3 shows a service engineer taking a titration sample from the chemical-injection line at Ranger.

Safety measures were carefully observed. Men who inserted and removed scrapers at the scraper traps (Fig. 4) wore rubber protective clothing and face shields. Fresh running water was available at each trap to wash off any acid that might accidentally splash on personnel. All scrapers removed from the acid solutions were dipped in a strong soda-ash solution and then rinsed with fresh water.

The disposal pit containing limestone was placed as far as possible from inhabited areas and located downwind (according to prevailing winds) from the station. Because of these precautions, no problems with hydrogen sulfide gas occurred.

Test-Section Cleaning

Samples of pipe removed from the test section before the cleaning treatment are shown in Fig. 5. After the Ranger-to-Weatherford test section was cleaned, six bell joints were cut out of the line at various points and sawed in half. Examination of these sections showed that all deposits had been removed from the line.

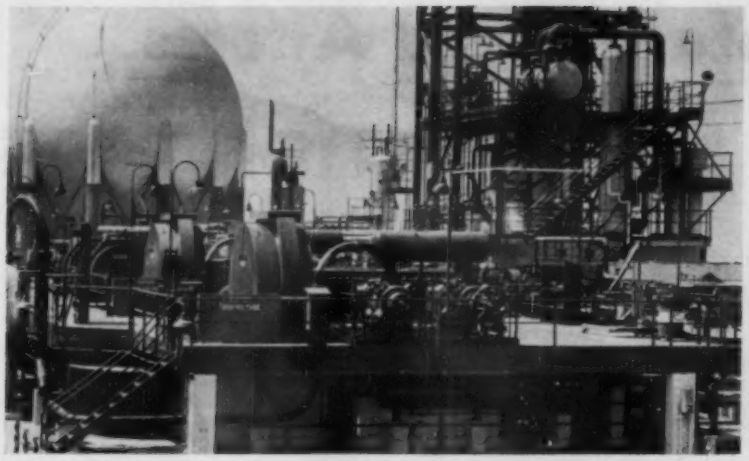
Fig. 6 shows a bell-joint section that had corroded badly during operation. Here again, all deposits have been thoroughly removed, even in the numerous pits. Fig. 7 shows one of these bell joints in which the pipe was still in excellent condition. It can be seen that this joint was metal-clean after the treatment. In Fig. 8, sections from both the 8-in. and 10-in. lines are shown, from which deposits have been completely removed.

Results of cleaning the test section showed that the method was a good one. The entire pipeline from Midland to Lufkin was then cleaned, using the same chemicals and procedures that were used in the Ranger-to-Weatherford section. Chemical injection points were set up (see map, Fig. 1) at Coahoma, Roscoe, Clyde, Eastland, Ranger, Weatherford, Grandview, Wortham, and Elkhart. Additional disposal pits were dug at Lufkin, Wortham, Roscoe, and Midland. Total cleaning time required for the remainder of the line was about 27 days.

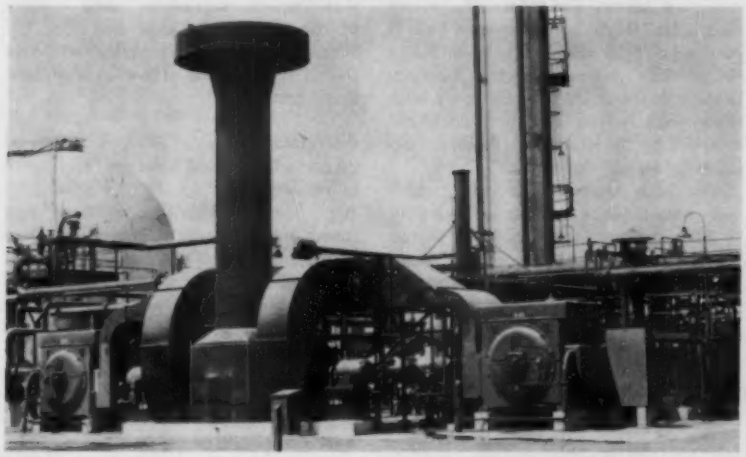
Conclusions

The completed cleaning job was highly satisfactory. For example, after displacing the treated line with refined products, only 2,172 bbl. required retreating.

The cleaning method employed in converting this crude line to field products not only afforded great savings in lost products, but also greatly shortened the cleaning time involved. Products now being received at terminals along this line are clean, and there have been no discoloration or scale problems. **End.**



California Standard's new synthetic ammonia unit



is notable on several counts, but mostly for its

Unhoused Compressor Plant

By D. H. Stormont
District Editor

LATEST ADDITION to an ever-growing group of petrochemical plants at Standard Oil Co. of California's Richmond refinery is a 300-ton per day synthetic ammonia plant.

Coupled with the project is a new nitric acid plant. Most of the output of both plants goes to the nearby plant of California Spray-Chemical Corp. for the production of fertilizers. Cost of the project, including the fertilizer plant, was $16,000,000.

Feed for ammonia synthesis is made by the Kellogg steam-methane reforming process, using natural gas as the normal charge stock. The plant is designed, however, to handle excess hydrogen from naphtha-reforming operations.

Of the plant's several features the one which stands out most is the open-air compressor plant.

The compressors and nearly all other process equipment are electrically powered. Steam turbines are used on some streams but only to the extent to arrive at a proper steam balance. All large motors use 12,000-volt current, the voltage at which power is distributed throughout the refinery.

Electric power was decided upon because of its initial economy and ease of maintenance. Further, use of the electric-driven units eliminated the need for a compressor building. A disadvantage is that a power failure for more than a moment or two results in a shutdown. So far there have been no interruptions, however.

. . . Total compressor horsepower in the plant is 15,800. Of this, centrifugal compressors account for 6,500 hp. and reciprocating units for 9,300 hp. The design basis was for a single centrifugal machine or two half-capacity reciprocating units per service.

Raw synthesis gas from the gas reformer is first boosted to 330 psi. in a single 4,000-hp. centrifugal compressor. This gas then is scrubbed free of carbon dioxide in an MEA system. From there it goes to two 3,000-hp. three-stage, horizontal, right-angle opposed compressors.

In the first stage the gas is boosted to 900 psi.; in the second to a discharge of 2,200 psi. Carbon monoxide removal is carried out between stages, by passing the gas through a copper ammonium acetate tower. The gas then is further compressed to 4,700 psi. for charging to the ammonia synthesis section.

Additional compressor equipment contained on the open deck includes two 900-hp. two-stage units for refrigeration, two 350-hp. units for recycling unconverted synthesis gas to the converter, and two 400-hp. compressors in reformer feed gas service. A 2,500-hp. centrifugal compressor supplies air to the reforming unit. As is the 4,000-hp. centrifugal used in raw synthesis gas service, this unit is located at ground level near the compressor deck.

. . . Forced-air ventilation is used on the totally enclosed motors driving these compressors. A 60-hp. blower supplies air to units in the main compressor plant and a 50-hp. blower serves the two centrifugal units. As mentioned earlier, the motors driving the four larger compressors (those over 2,000 hp.) are supplied 12,000-volt current. The other units used 2,400-volt current.

In place of the usual overhead traveling crane used to service compressors installed in a building, a motor crane is used. Small loads are handled by a portable 1-ton crane which can be rolled about the compressor deck.

The single ammonia converter used is the largest ever built for a steam-methane reforming plant. The 50-in. i.d. vessel is 48 ft. long. Control of catalyst-bed temperatures in each of six beds is accomplished by interbed quenching. **End.**

How Rotary Speed Affects PENETRATION RATE

By J. E. Eckel and D. S. Rowley

An A.A.O.D.C. committee composed of personnel from drilling and equipment companies have made a joint study of the factors that enter into the effect of weight and speed of rotation on penetration. The test site was in Dora Roberts field near Odessa, Tex. An exploration drilling company rig was used to drill The Texas Gulf Producing Co.'s well, Roy Parks B-23. Here is a report of the rotary-speed study.

A total of 107 separate tests were run on the two wells—Roy Parks B-23 and B-25. Of these 107 tests, 36 were run with the weight and all other functions held constant, rotary speed being the only variable.

In general, for both carbide-studded bits and conventional milled toothed bits, a preselected interval of time or footage was drilled at each speed in the tests. Rotary speed was generally increased in increments of 5 or 10 r.p.m. from a minimum speed to the maximum in the test. Then in certain cases, speed was reduced to the minimum in similar increments. This procedure was intended to help average out the drilling-rate effects of local formation changes and to minimize the effects of bit dulling.

Authors are with Carter Oil Co., Tulsa. Paper presented at A.A.O.D.C. annual meeting, Tulsa, 1957.

Fig. 1 shows two plots of drilling rate data from rotary-speed Test 9 on Parks B-23 and Test 21 on Parks B-25. The big difference between drilling rates at equal speeds in both these tests is due mainly to localized changes in formation drillability occurring during the test.

On both wells, rotary-speed tests were made at constant bit weights. The bit weights used, however, varied from test to test in the range 20,000 to 50,000 lb. The range of rotary speeds was from 20 to 50 with carbide-studded bits and 30 to 115 with milled tooth bits.

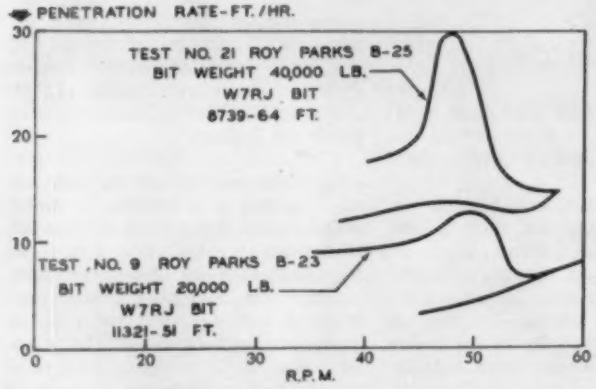
Results

Analysis of all available weight and speed data together showed that local formation changes in the test intervals radically influenced the results of any one given test. For instance, Fig. 2 shows drilling rate plotted against depth for a test made at constant circulation rate. Drilling rate in this particular test varied about 50 per cent, from maximum to minimum, presumably as a result of local formation effects.

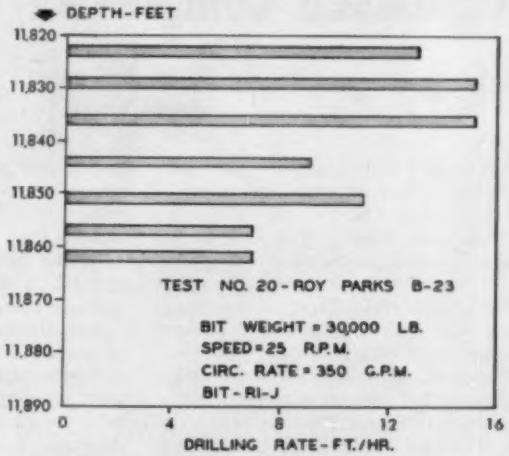
Although this example is not necessarily an average situation, there was enough scatter of data in any of the tests to indicate the need for averaging a large number of data points in order to arrive at any concrete results.

Correlation . . . Data from tests taken with milled toothed bits were combined. The results, as shown in Fig. 3, indicated that drilling rate increased with rotary speed less than proportionally. This type curve can be represented by an equation of the form $RDR = a + bn + cn^2$, where RDR is relative drilling rate; n the rotary speed; and a, b, c are arbitrary constants. In Fig. 3, $a = +2.91$; $b = +1.16$, and $c = -0.0029$, approximately.

A composite of all tests for carbide-studded bits is shown in Fig. 4. Again it was indicated that the drilling rate increased with rotary speed less than proportionally.



EFFECTS of local formation changes on penetration rate. Fig. 1.



VARIATIONS in drilling rate for constant weight, constant speed, and constant circulation rate. Fig. 2.

The tendency of the penetration-rate curve to flatten out at higher speeds was more pronounced with the carbide-studded bits than with milled toothed bits.

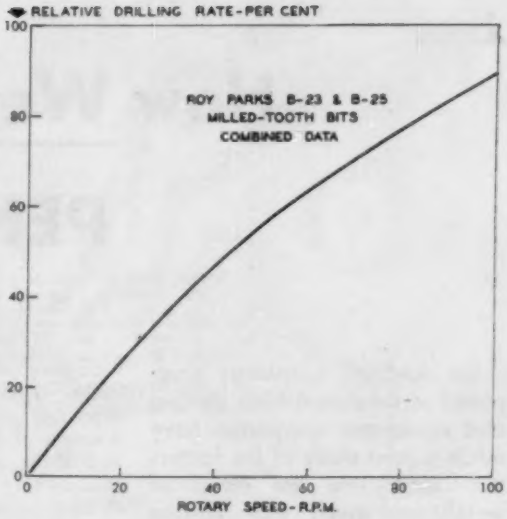
The flattening of the rotary-speed versus penetration-rate curve at higher speeds seems to indicate that when bit weight is held constant, individual tooth contacts at higher speeds are not as effective in removing the formation as contacts at lower speeds. The reduced effectiveness of high-speed contacts may be an effect of time. The tooth delivers an impulse—the product of a force and the time interval over which it acts—to the formation which is smaller at higher speeds than at low speeds, assuming the bit weight to be the same in both cases.

Thus, if future tests substantiate the flattening trend of the rotary curve (and certainly we will need many more tests), it may be possible to conclude that the low rotary speeds permit the bit teeth to use available weight to the best advantage. It does not appear likely that the flattening of the speed curve can be attributed to cleaning effects, since high circulation rates in the range of 370 to 440 g.p.m. were maintained for the 7⅞-in. hole experiment.

Problems . . . Although there have been many improvements in the basic test procedure since the first tests were run on Parks B-23, there are still indications of the need for further improvement. At the same time, it is also true that strict techniques cannot always be attempted when the contractor is trying to make hole, so various compromises must be made in the test procedure to facilitate drilling progress.

One indication of a needed change in test procedure is brought out by attempting to crossplot the results of both the variable-speed and variable-weight tests. Even when all the data are analyzed by exactly the same methods, a slight disagreement in results is found. In Fig. 5 this is shown at 100 r.p.m. where the solid dots indicate "results" and open circles indicate "required for agreement."

One test procedure that might correct this situation is illustrated in Table 1.



EFFECT of rotary speed on penetration rate. Fig. 3.

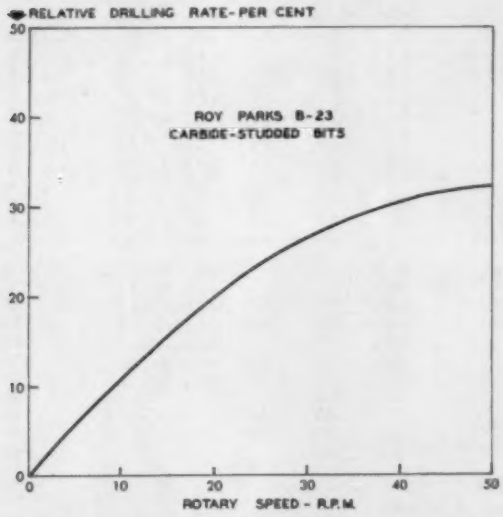
With a standard condition such as 40 r.p.m. and 30,000 lb. run on each test, and then available for comparison, the data could be more accurately analyzed. Crossplotting the new results should then check, assuming that a sufficient total amount of data is accumulated to effectively average out localized formation effects.

TABLE I—SPEED TESTS
Standard Condition Is Assumed As 40 R.P.M., 30,000 Lb.
Sample Test

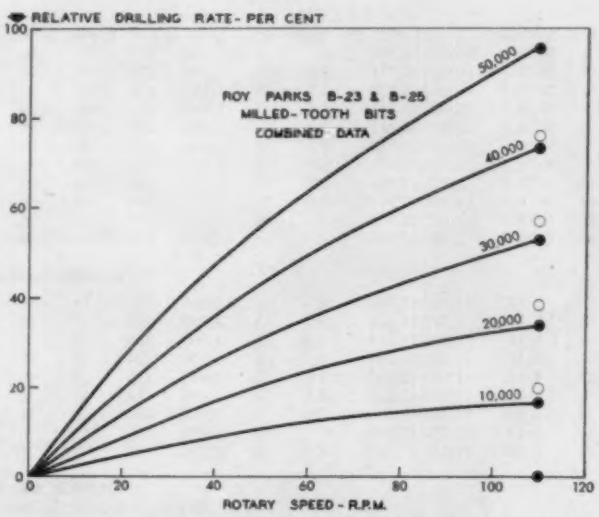
Speed	Weight
40	30,000
20	20,000
40	20,000
60	20,000
80	20,000
100	20,000
40	30,000

Other problems concern rotary-speed control and drilling-rate measurements. In the tests to date it has been difficult mechanically to maintain a constant rotary speed and vary it through an established pattern. Up to now this appears to have been the result of slight difficulties in holding the required throttle linkage setting on the rotary-drive engine.

Also, in the measurement of drilling rate, it would be helpful to have an instrument capable of measuring short intervals accurately, thus relieving the driller of this responsibility and improving the quality of penetration-rate recordings.



EFFECT of rotary speed on penetration rate. Fig. 4.



EFFECT of rotary speed on penetration rate. Fig. 5.

How Weight Affects PENETRATION RATE

By H. B. Woods and E. M. Galle

An AAODC committee composed of personnel from drilling and equipment companies have made a joint study of the factors that enter into the effect of weight and speed of rotation on penetration. The test site was in Dora Roberts field near Odessa, Tex. An exploration drilling company rig was used to drill Texas Gulf Producing Co.'s well, Roy Parks B-23. Here is a report of the weight study.

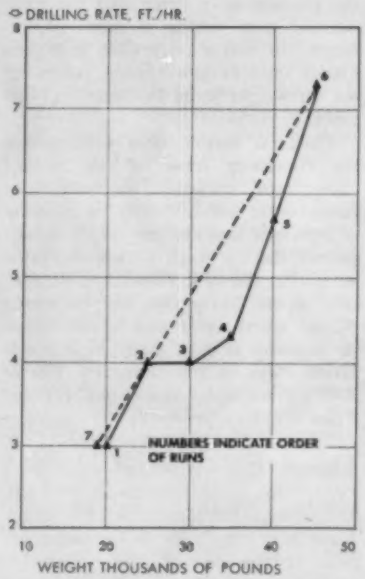
On the first well (Roy Parks B-23) testing began at a depth of 10,190 ft. and continued to approximately 13,000 ft. Both toothed and carbide-studded bits were used during the tests. Drilling intervals of from 20 to 30 minutes were used for toothed bits during the weight tests on this well. The test procedure consisted of beginning at a weight of 20,000 lb. and increasing in 5,000-lb. increments to 50,000 lb., then running a check interval at 20,000 lb. to determine how much the formation had changed (Fig. 1).

Sometimes it appeared that this procedure indicated something about the uniformity of the formation being drilled; however, in many tests it was apparent that the formation may have changed considerably several times during one test (Fig. 2).

As a result of the experience gained on the first well, the test procedure was revised on Roy Parks B-25. On this well, the range of weights covered was reduced to include only 30,000 to 50,000 lb., and the weight was increased in 5,000-lb. increments up to 50,000 and then reduced by the same increments back down to 30,000 lb. (Fig. 3).

Purpose of this procedure was twofold. First, it was to average out as

Authors are with Hughes Tool Co., Houston. Paper presented at AAODC annual meeting, Tulsa, 1957.



TEST 1 on Roy Parks well using toothed bits. Fig. 1.

TABULATION OF DATA, ROY PARKS B-23
(Bit size 7⅞-in.)

Toothed Bits

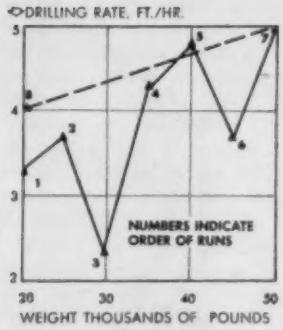
Test	Bit type	Depth (ft.)	Circ. fluid (lb./gal.)	Nozzle size (in.)	Pressure (psi.)	G.p.m.	R.p.m.	Interval (min.)	Penetration rate, ft./hr., at weight indicated: 20,000 lb.	25,000 lb.	30,000 lb.	35,000 lb.	40,000 lb.	45,000 lb.	50,000 lb.	Order
1	W7R-J	10,192-10,208	8.7	7/8	1,550	412	55	30	3.0-3.0	4.0	4.0	4.3	5.7	7.3	...	A
3	W7R-J	10,323-10,374	8.8	7/8	1,550	428	75	30	4.5-4.3	5.0	6.0	10.5	11.8	8.7	...	A
4	W7R-J	10,391-10,420	8.5	7/8	1,550	430	42	30	3.3-4.0	3.7	2.3	4.3	4.8	3.7	5.0	B
5	W7R-J	10,447-10,465	8.6	7/8	1,550	412	60	30	2.7-2.3	4.7	4.3	4.0	7.7	8.0	...	A
6	W7R-J	10,465-10,481	8.9	7/8	1,600	406	70	30	3.0-2.7	3.3	3.3	4.3	9.3	5.3	...	A
7	W7R-J	10,507-10,530	8.8	...	1,600	415	30	30	4.0-3.3	3.5	4.3	5.3	6.6	7.0	7.0	B
8	W7R-J	10,530-10,550	8.9	7/8	1,700	418	50	30	3.0-3.0	3.3	4.3	6.3	4.3	7.5	7.5	B
43	W7R-J	12,893-12,906	8.5	1/2	1,550	394	70	20	3.0	3.5	5.0	6.5	10.0	11.0	...	A
44	W7R-J	12,906-12,917	9.0	1/2	1,550	394	60	20	3.5	4.5	5.3	5.5	7.3	7.7	...	A
45	W7R-J	12,917-12,930	8.9	1/2	1,550	394	50	20	3.5	6.0	5.7	6.5	8.3	9.3	...	A
46	W7R-J	12,930-12,942	8.7	1/2	1,550	394	75	20	3.5	3.5	6.0	6.5	8.0	8.5	...	C

Carbide-Studded Bits

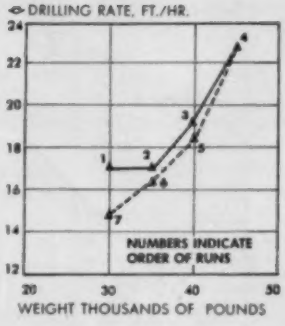
17	R-1J	11,780-11,794	8.8	7/8	1,500	350	30	30	6.0	6.0	6.7	8.0	...	...	...	D
18	R-1J	11,797-11,808	8.9	7/8	1,500	370	25	30	3.0	4.5	9.0	6.0	...	...	...	D
19	R-1J	11,810-11,819	8.9	7/8	1,500	360	40	30	5.5	5.5	5.5	...	...	...	...	D
24	R-1J	11,982-11,988	8.8	7/8	1,500	394	30	30	2.0	4.0	4.0	3.0	...	...	...	D
25	R-1J	11,999-12,012	8.5	7/8	1,600	370	25	60	2.0	2.7	3.5	4.8	...	...	...	D
26	R-1J	12,012-12,021	8.8	7/8	1,850	418	40	30	4.3	6.0	6.5	...	...	...	...	D
30	R-1J	12,265-12,274	9.0	7/8	1,950	424	30	30	2.3	3.0	4.3	4.5	...	...	...	D
31	R-1J	12,274-12,281	...	7/8	1,650	380	25	30	2.5	2.3	2.7	3.0	...	...	...	D
32	R-1J	12,282-12,287	8.9	7/8	1,750	394	40	30	3.3	4.3	4.0	...	...	...	...	D

ORDER OF RUNS
(Weight indicated in thousands of pounds)

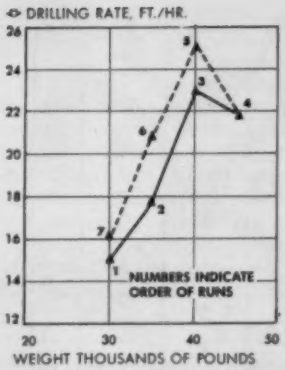
A—20, 25, 30, 35, 40, 45, 20. B—20, 25, 30, 35, 40, 45, 50, 20. C—45, 40, 35, 30, 25, 20. D—20, 25, 30, 35.



TEST 4 on Roy Parks B-23 shows several formation changes. Fig. 2.



WEIGHT RANGE was decreased and weight was alternately increased and decreased to get these fairly consistent results. Fig. 3.



THE NEW PROCEDURE, however, still left much to be desired. Fig. 4.

TABULATION OF DATA, ROY PARKS B-25

(Bit size 7⅞-in.)

Toothed Bits

Test	Bit type	Depth (ft.)	Circ. fluid (lb./gal.)	Nozzle size (in.)	Pressure (psi.)	G.p.m.	R.p.m.	Interval (ft.)	Penetration rate, ft./hr., at weight indicated: 30,000 lb.	35,000 lb.	40,000 lb.	45,000 lb.	50,000 lb.	Order
1	OWC-J	6,851- 6,883	Water	3/16	1,700	418	60	2	17.1-15.0	17.1-16.5	19.2-18.5	22.8	.....	E
2	OWC-J	6,884- 6,905	Water	3/16	1,700	418	70	2	15.0-16.0	17.8-20.9	23.0-25.2	21.8	.....	E
3	OWC-J	6,914- 6,935	Water	3/16	1,700	418	80	2	13.3- 7.8	14.5-10.4	15.5-14.5	18.5	.....	E
4	OWC-J	6,980- 7,002	Water	3/16	1,600	424	60	3	18.0-12.0	18.0-11.3	18.0-22.5	25.8	.....	E
5	OWC-J	7,003- 7,028	Water	2 3/16, 1 7/16	1,600	424	70	3	12.0-20.0	12.9-20.0	18.0-22.5	25.8	.....	E
6	OWC-J	7,029- 7,050	Water	2 3/16, 1 7/16	1,600	418	80	3	12.0- 7.2	18.0-11.3	16.4-13.9	20.0	.....	E
7	OWC-J	7,050- 7,080	Water	2 3/16, 1 7/16	1,550	418	80	5	.....	.....	10.7-10.0-15.0	14.3-21.4-11.1	.....	F
9	OWC-J	7,395- 7,419	Water	3/16	1,600	394	70	3	.....	20.0-22.5-22.5	24.0-25.8-25.8	.....	.....	G
13	W7R-J	8,021- 8,052	Water	7/16	1,550	448	60	2	7.5-10.4	9.6-10.9- 9.2	9.2-12.6- 9.2	15.0- 9.2	.....	H
14	W7R-J	8,053- 8,081	Water	7/16	1,550	448	70	2	8.6	10.9-12.0	13.3-15.0-15.0	13.3-15.0	.....	I
15	W7R-J	8,081- 8,103	Water	7/16	1,550	448	80	2	8.6- 9.3	13.3-10.0-10.9	15.0-13.3-13.3	17.1-15.0	.....	H
17	W7R-J	8,330- 8,373	Water	7/16	1,550	430	70	5	11.5- 9.1	13.0-13.0	15.8-15.8	17.6	.....	E
18	W7R-J	8,373- 8,415	Water	7/16	1,500	430	80	5	10.0- 8.3	10.7-10.0	15.0-10.7	13.6	.....	E
22	W7R-J	8,933- 8,961	Water	7/16	1,525	438	75	2	6.7- 6.0	7.1- 9.2- 6.0	8.6- 8.0- 5.7	12.0- 6.0	.....	H
23	W7R-J	8,987- 9,014	Water	7/16	1,500	438	70	2	7.5- 8.0	8.6- 9.2- 7.5	15.0-13.4- 8.6	17.2-12.0	.....	H
24	W7R-J	9,055- 9,085	Water	7/16	1,500	436	60	2	10.0- 8.0	10.9-10.9-10.9	12.0-12.0-12.0	15.0-10.9	.....	H
26	W7R-J	9,635- 9,659	8.6	7/16	1,550	418	60	2	8.6- 5.0 5.5	8.6- 8.0- 6.0 6.7- 6.3	17.3- 8.6- 8.0	.....	.....	J
27	W7R-J	9,683- 9,710	8.7	7/16	1,500	406	50	2		3.4- 4.8	4.3- 4.0- 5.5	5.5- 3.9- 6.0	8.7-6.3	K
28	W7R-J	9,745- 9,711	8.7	7/16	1,550	400	70	2	5.2- 5.5	5.5-10.0- 6.7	9.3- 8.6- 8.0	7.5-12.0	.....	H
32	OWC-J	10,693-10,737	8.8	½, 7/16, 7/16	1,200	285	80	5	.....	14.0-12.5-12.5 12.5	14.0-15.0-12.0 21.4	.....	.....	G
45	W7R-J	12,215-12,228	8.9	½	1,700	400	70	3	.....	4.0	4.0	4.7	.....	L
46	W7R-J	12,231-12,240	8.9	½	1,900	406	50	2	.....	.....	2.9- 3.4	5.0- 5.0	.....	F
49	W7R-J	12,360-12,387	8.9	½	1,900	400	55	5	.....	5.0- 3.4	6.3- 4.5	5.7- 4.9	.....	L
51	W7R-J	12,618-12,645	8.9	½	1,900	400	60	5	.....	3.6- 5.3	5.8- 5.7	5.5- 6.4	.....	L
52	W7R-J	12,660-12,683	8.9	½	1,975	406	50	5	.....	.....	4.5- 5.1	4.5	3.5	M
53	W7R-J	12,720-12,743	9.0	½	1,850	346	50	3	.....	5.1- 5.0	5.4- 4.9	6.2- 6.7	7.8	N
55	W7R-J	12,865-12,897	8.8	½	2,050	400	55	5	.....	6.4	7.3	7.3- 7.7 7.5- 6.1	.....	O

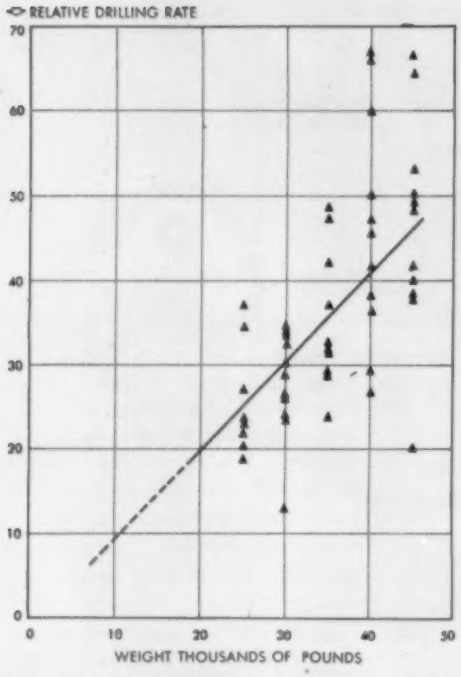
Carbide-Studded Bits

36	R-1	11,568-11,586	8.8	11	1,150	430	31	2	2.7- 1.8	3.0- 2.0	3.9- 4.0	4.0- 3.2	.....	P
37	R-1	11,568-11,586	8.7	11	1,375	400	30	2	4.4- 4.8	4.4- 3.9	4.3- 4.7	4.8	.....	E
39	R-1	11,675-11,698	8.8	11	1,325	415	42	3	5.8- 5.3	5.3- 6.2	6.7- 6.7	6.7	.....	E
40	YC-J	11,781-11,807	8.8	11	1,625	405	47	3	8.2- 8.5	7.2- 9.5	8.5- 7.8	10.0	.....	E
41	YC-J	11,830-11,851	8.8	11	1,625	395	45	3	4.2- 4.7	4.3- 6.9	4.8- 9.0	4.7	.....	E
42	YC-J	11,880-11,907	8.8	11	1,625	400	35	3	6.4- 7.2	7.8- 7.8	9.0- 8.2	7.5	.....	E
43	YC-J	11,910-11,931	8.8	11	1,675	395	30	3	6.0- 4.0	4.3- 3.6	4.7- 4.0	5.1	.....	E

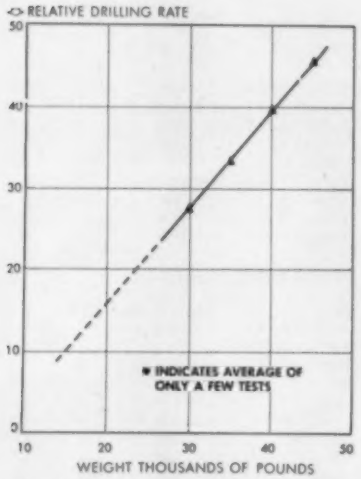
ORDER OF RUNS

(Weight indicated in thousands of pounds)

E—30, 35, 40, 45, 40, 35, 30
F—40, 45, 40, 45, 40, 45
G—35, 40, 35, 40, 35, 40
H—30, 35, 40, 45, 40, 35, 30, 35, 40, 45
I—40, 45, 40, 35, 30, 35, 40, 45
J—30, 35, 40, 35, 30, 35, 40, 35, 30, 35, 40
K—50, 45, 40, 35, 40, 45, 50, 45, 40, 35
L—35, 40, 45, 40, 35
M—40, 40, 45, 50
N—25, 40, 45, 50, 45, 40, 35
O—35, 40, 45, 45, 45, 45
P—30, 35, 40, 45, 45, 40, 35, 30

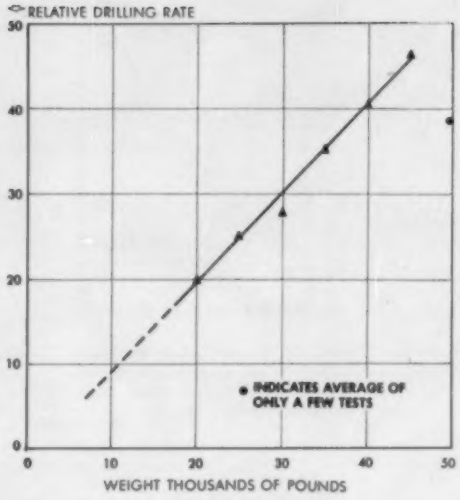


RELATIVE DRILLING RATES were used to smooth out the data. Fig. 5.

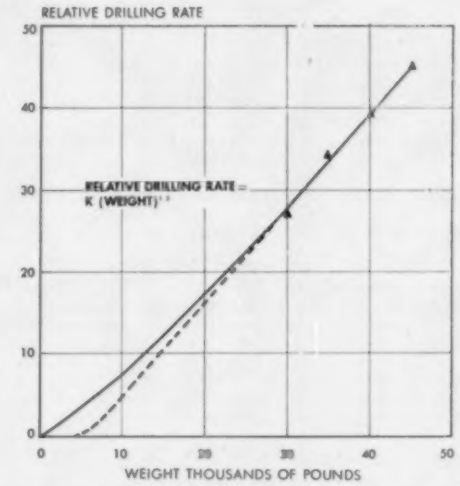


AVERAGED DATA from second well agreed closely with first well. Fig. 7.

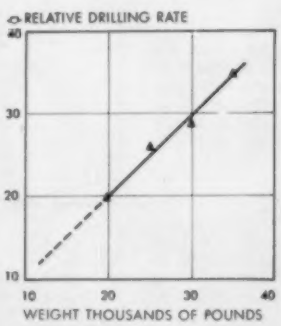
much as possible the variations in formation, and second, it was hoped that some information could be gained on the degree of dulling of the bit that had occurred during the test. Without doubt, the procedure on the second well was better than that used on the first. However, even this procedure left much to be desired (Fig. 4.) Test procedures for the carbide-studded bits were very similar to those used for toothed bits. All data concerning the weight tests are tabulated in accompanying table.



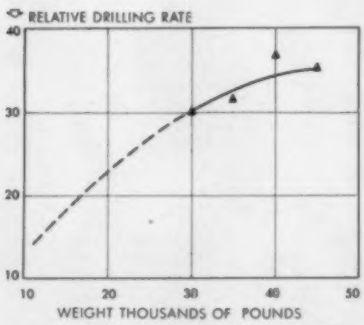
AVERAGED DATA then correlated satisfactorily. Fig. 6.



RELATIVE DRILLING RATE using combined data correlate very well with weight. Fig. 8.



WEIGHT-RATE relationships on Roy Parks B-23 for carbide-studded bits. Fig. 9.



WEIGHT-RATE relationships on Roy Parks B-25 for carbide-studded bits. Fig. 10.

Results

In analyzing these data, it became readily apparent that formation changes occurred many times during individual tests and that formation drillability changed greatly from one test to another. Since the scatter in any one test was so great that it pre-

vented any significant interpretation, it was necessary to find some manner of combining the results from a large number of tests to average out the formation variable.

Since the formation drillability changed greatly from test to test, a direct averaging of the drilling rates of all tests at a specific weight would be meaningless.

A very convenient manner of averaging the data where drilling rates vary appreciably from one test to another is through the use of relative drilling rates and all remaining figures are plots of relative drilling rate versus weight (Figs. 5 and 6). We will not explain the details of the method. However, the results obtained give a ratio of relative drilling rates for any two weights that will be the same as the ratio of the actual drilling rates at those weights.

All the data from each well were averaged and the results from the two wells were almost identical (Figs. 6 and 7).

The over-all averages of the effect of weight showed approximately a straight-line relationship between weight and drilling rate, with a slope such that within the range of weights investigated a 50 per cent increase in weight will give about a 65 per cent increase in drilling rate (Fig. 8). Actually, approximate slope of the line in the normal range of operating weights is of much greater significance than whether it is straight or not, since the slope of the line determines the amount of advantage to be gained by increasing weight.

The relation between weight and penetration rate at very low weights was not investigated. Since the exact shape of the weight versus drilling rate curve is not known in the lower weight region, the results of the data obtained, within the limits of these tests, could be approximated with a power curve of Relative Drilling Rate $= K\,(\text{Weight})^n$, where K is a constant and n is approximately 1.2.

On Roy Parks B-23, the relationship between weight and drilling rate for carbide-studded bits was similar to that for toothed bits (Fig. 9). Tests with carbide-studded bits on Roy Parks B-25 showed less increase in drilling rate with increased weight than was noted for the toothed bits (Fig. 10). Bit hydraulic horsepower was very low during the time that the carbide-studded bits were run on this well, and perhaps the results obtained may have been greatly influenced by that factor.

Due to formation drillability changing so often during an individual test, a study of the variations in the effect of weight on drilling rate from one formation to another could not be made.

Major problems . . . The major problem encountered was formation variables, as is generally the case in tests of this nature. Other difficulties such as accurate timing of intervals, dulling of the bit, maintaining constant rotary speed, pump strokes, and bit load were encountered. But these were minor in comparison with the formation variables.

Future tests . . . Future tests should enable the committee to refine the results obtained thus far and extend the range of weights investigated. Testing in other parts of the country should provide a basis for determining whether the weight versus drilling rate relationship is substantially the same for different areas and formations.

Variations in a formation's drillability is something that cannot usually be foreseen, and any test procedure should take this fact into consideration. Present plans for any further testing of the relation between weight and penetration rate are to select only two weights whose magnitudes are such that the change in drilling rate obtained by alternating the weights will be greater than the normal scatter at a given weight (Fig. 4).

It is felt that this procedure will be a big improvement over past procedures used with respect to eliminating formation variables and effect of bit dulling. With further testing and improved test techniques, we hope to be able to determine the relationship between weight and drilling rate for a given formation.

In discussing the foregoing paper, Arthur Lubinski, Pan American Petroleum Corp., suggests an alternative method of obtaining an

Improved rate-weight curve over a very short interval

THE WORK of the Weight-Speed Penetration Study Committee should be highly commended. To conduct such a study one must have a real patience and determination, and all the members of the committee have shown that they have both these qualities to a high degree.

The difficulty is that drilling characteristics of formations are generally changing from layer to layer. Rarely are the same characteristics encountered in successive 2-ft. intervals. And to obtain the rate versus weight law in some formation for a constant value of r.p.m. and for weights varying from 30,000 to 50,000 lb. by 5,000-lb. increments, the formation characteristics should remain the same over an interval of 12 ft. (including the last interval run with the same weight as the first one). This explains the enormous scatter of results reported by H. B. Woods.

The method he proposes to use in the future is appreciably better. It consists of carrying alternately two weights only. This will require a homogeneous section of 6 instead of 12 ft. With care one could measure the rate of drilling over 1-ft. instead of 2-ft. intervals and thus reduce the above-mentioned 6 ft. to 3 ft. But even the results of such a method are bound to present a great scatter, and a very large number of measurements will be needed to arrive statistically at significant results.

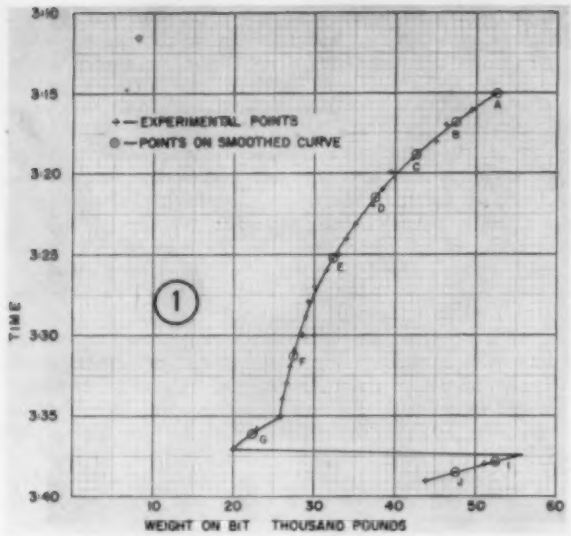
Purpose of this discussion is to propose a method which should permit determination of an entire rate-versus-weight curve over a very short interval, generally of a few inches. The method consists of either recording, or reading and plotting, weight versus time during drilling-off periods. Fig. 1 shows such a hypothetical plot. In order to correct for experimental errors, a smooth curve is drawn through experimental points.

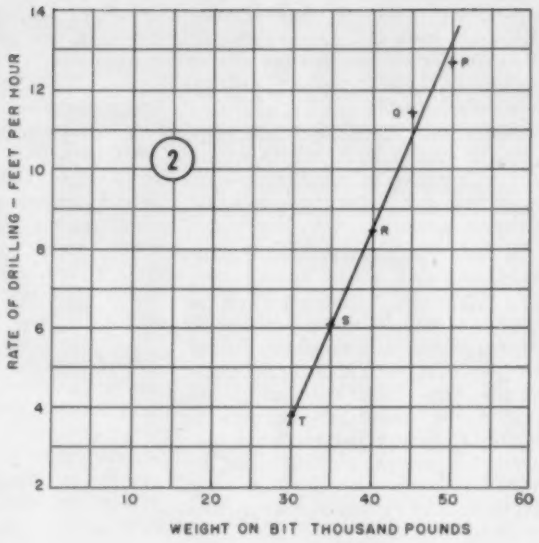
Consider now points A and B located on the smoothed curve and corresponding to weights on bit of 52,500 and 47,500 lb. respectively. The time interval between A and B is 1.8 minutes. Thus the rate R_w with which the weight is dropping is equal to:

$$R_w = \frac{52{,}500 - 47{,}500}{1.8}$$

$= 2{,}777$ lb./min. $= 166{,}600$ lb./hr.

As proven in the appendix, the





relationship between R_w and the rate of penetration R_p is as follows:

$$R_p = L \times 1/EA \times R_w \qquad (1)$$

in which:

R_p = rate of penetration in feet per hour.

R_w = rate with which the weight on the bit is decreasing in lb. per hour.

E = Young modulus of steel: E = 30×10^6 psi.

A = cross-sectional area of drill pipe wall in sq. in.

L = length of drill pipe in feet.

For 4½-in., 16.6-lb. per foot drill pipe, A is equal to 4.407 sq. in. Consider that the results of Fig. 1 were obtained with a length of drill pipe equal to about 10,000 ft. Then Equation 1 becomes:

$$R_p = 76 \times 10^{-6} R_w \qquad (2)$$

Thus for the interval AB the rate of drilling is:

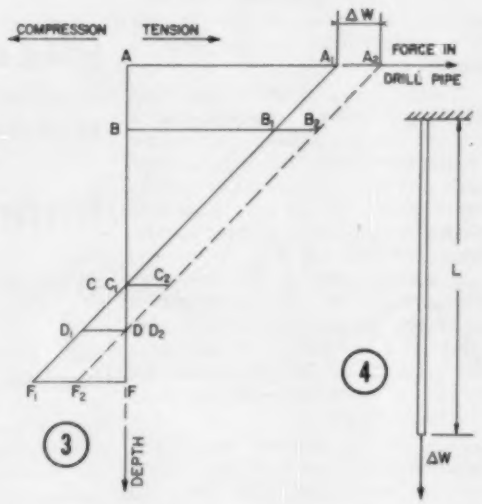
$$R_p = 76 \times 10^{-6} \times 166{,}600$$

$$= \mathbf{12.7\ ft.\ per\ hour}$$

which corresponds to an average weight on bit of 0.5 (52,500 + 47,500) = **50,000 lb.**

In Fig. 2 is plotted the rate versus weight. Point P (50,000 lb., 12.7 ft. per hour) represents the result so far obtained from the hypothetical record, Fig. 1. Repeating the same calculations for intervals BC, CD, DE, and EF, the rates of penetration in the investigated formation for weights on bit of 45,000, 40,000, 35,000, and 30,000 lb. are obtained and plotted in Fig. 2 at Q, R, S, and T.

WEIGHT VERSUS TIME plot during drilling-off periods permits determination of rate-versus-weight curve shown in Fig. 1 at left above. The interval A-F in Fig. 1 is shown in Fig. 2 as a rate-weight curve. Force in the drill pipe versus depth is shown in Fig. 3. Elongation of the system in Fig. 3 is equivalent to that in Fig. 4.



Each value of the rate of penetration is thus measured over a very short depth interval ΔL which, as shown in the appendix, may be calculated as follows:

$$\Delta L = L \times 1/EA \times \Delta W \qquad (3)$$

in which ΔW is the drop of weight in pounds in the depth interval ΔL in feet. For 4½-in., 16-lb. per foot drill pipe and a 10,000-ft. length of drill pipe, Equation 3 becomes:

$$\Delta L = 76 \times 10^{-6} \Delta W \qquad (4)$$

Thus for intervals ΔW of 5,000 lb., we obtain:

$$\Delta L = 76 \times 10^{-6} \times 5{,}000$$

$$= 0.38\ \text{ft.} = 4.56\ \text{in.}$$

ΔL would even be smaller at depths shallower than 10,000 ft. used in the example.

From the above it is seen that in the proposed method the rate of drilling is measured over very short depth intervals, thus greatly increasing the probability that formation characteristics will remain constant. Therefore, the number of experiments could be much smaller than with the presently used technique. The results should be obtained faster and at less expenditure.

Another advantage of the proposed method is that changes in formation characteristics are seen in the record. For instance, in the hypothetical record, Fig. 1, a much softer formation was encountered at 3:35, i.e., between points F and G. Thus one may reject from consideration intervals, such as FG, containing a formation change. After such a change, one may immedi-

ately use the intervals which follow, such as IJ, to investigate the rate-versus-weight law in the newly encountered formation.

Appendix

Fig. 3 is a diagram of force in the drill pipe versus depth. AA_1 represents the tension in the string at the surface, BB_1, the tension at depth B, etc. The neutral point is at C. At the depth D, the string is under compression DD_1. Finally at the lower end of drill pipe the compression is FF_1.

For the sake of simplicity, no drill collars are considered, the conclusion which will be reached being independent of the presence of collars. Consider now that a weight ΔW has been drilled off. The corresponding situation is indicated with a dashed line. The tension at the surface is now AA_2 (A_1A_2 representing ΔW), the tension at the depth B increased from BB_1 to BB_2. At C, zero tension increased to a tension CC_2. At D the compression DD_1 became nil. And finally at F the compression FF_1 decreased to the value FF_2.

From inspection of Fig. 3, it is seen that at any point, either the tension increased by ΔW, or the compression decreased by the same amount ΔW, or the compression became tension, the total change being again ΔW. An increase of tension has the same effect on elongation as an equal decrease of compression. Therefore, as far as elongation is concerned, the system of Fig. 3 is equivalent to that of Fig. 4, which represents a pipe, at the bottom of which a tension ΔW is applied. The corresponding elongation ΔL, obtained from Hooke's law is Equation 3, previously considered.

Taking the derivative with respect to time of ΔL and ΔW in Equation 3, Equation 1, previously considered, is obtained.

DRILLING

PROGRESS REPORT:

Air and Gas Drilling

Six study groups (API-AAODC) are investigating equipment requirements, practices and procedures, water locations and shutoff, and aerated muds. Here's what they're learning

By M. McGehee Brantly

PRIMARY compressors are usually two-stage positive-displacement machines, designed to operate continuously, at pressures up to 250 or 350 psi., each compressor being capable of furnishing from 500 to 750 cu. ft. per minute.

Booster equipment used in conjunction with these primary machines generally have a maximum working pressure of 1500 psi. These compressors are available with their own prime movers, or at the option of the user, are equipped to be driven from the mud-pump drive on the rig.

Heavy-duty oil-bath air cleaners are essential and these must be serviced frequently if reasonable life is to be obtained from the compressor. Inner coolers are standard on all two-stage machines and it has been found helpful to use aftercoolers in most cases. It is possible for the air temperature without aftercoolers to exceed the maximum working temperature of rotary hoses and other rubber goods used in the system.

In some areas, it has been found very beneficial to use a discharge scrubber in conjunction with the aftercooler. This not only removes any water from the air stream, but in addition, removes any oil carryover from the compressor.

Although the normal rotating blowout preventer is rather expensive, it is the best equipment known to control dust and fluid discharge at the top of the hole.

It has been found convenient to employ flexible connections between the air compressors and the manifold, but where possible, rubber hose should be avoided.

Many attempts have been made to eliminate or reduce the nuisance of dust from the air returns. The severity of this problem, of course, depends on the proximity of the job to civilization. In any event, it is desirable to knock out the majority of the dust to prevent excess wear and tear on the drilling equipment and the compressors. Probably the two most successful methods of dust control are the introduction of a water spray into the flow-line or placing the end of the flow-line several inches under water in the pit. Cyclone-type separators are successful to some extent, but they are not entirely satisfactory.

In using aerated mud to combat lost circulation. it has become apparent that while volume requirements can be reduced considerably from those of normal air drilling, it is essential that high-pressure equipment (preferably 1,500 psi.) be used. In this application, extreme care should be taken to protect the air compressors from mud by the use of adequate check valves.

The most promising of several new drilling techniques is the so-called "mist-soap" drilling with which experimenting has been done recently. In this method, very small quantities of water which has been treated with an anticorrosion agent and a chemical called "soap", is injected into the air stream. There are several benefits derived from the addition of this soap, but it is also very easy to get arguments as to just what effect the soap has in the hole.

We feel that the primary function of the soap is to lubricate the walls of the hole as well as the individual particles being blown off bottom. At some point in the ascending column, this soap also causes a foaming action which distributes the fluid more evenly in the column and reduces the tendency to form heads.

A variation of soap injection is the injection of a dry powder mixed with a dry corrosion inhibitor into the air stream and the use for fluid of only the water being produced in the hole.

Work has also been done in the use of a dry waterproofing chemical in combating low volume water entry. This powder is injected through a hopper into the air stream to waterproof the cuttings on bottom before they reach the water-bearing zone.

Another dry chemical which is being used to some extent is injected to absorb water in the hole without forming a sticky substance and is quite helpful in speeding up the drying of a long string of pipe.

At least one equipment manufacturer is working on a device to be run in the float recess of the bottom-hole drill collar to indicate whether or not a hole has exceeded a predetermined deviation. Basically,

Author is president, Brantly Drilling Co., Midland, Tex. Paper presented at AAODC annual meeting, Tulsa, 1957.

this tool is a float valve attached to a plumb bob. If the deviation is greater than the amount for which the tool is set, the plumb bob strikes a shoulder preventing the valve from opening, thereby building up abnormal pressure at the surface. If desired, this pressure can then be released and normal drilling resumed.

Water location . . . The primary areas under study at the present time are in the vicinity of Mentone, in Loving County, Texas, and in northeast Lea County. It is hoped that this work will not only furnish valuable information on this particular area, but will also serve as a basis for determining what logs are useful, and what methods of interpretation are most reliable.

Of primary importance is the determination of areas where air drilling is feasible. Of secondary importance is the determination of casing points which will successfully shut off surface water and the determination of the thickness of water-bearing zones below the casing point.

With this information available, it will be possible to decide whether any extra pipe required is economically justifiable and whether or not it is practical to attempt to obtain a water shutoff, rather than change to "mist" or water drilling.

Radioactive logs have been successfully used for this purpose in the San Juan basin and more work is being done in an attempt to evaluate these logs for use in other areas.

Water shutoff . . . most of the water-shutoff methods use some type of plastic because of the ease of controlling setting time and the ease of handling. There are, in general, two approaches to the plastic shutoff. In soft formations, or for extremely porous water zones, a high-viscosity plastic is used and is put in place by the use of relatively low pressure. This procedure, in many cases, is almost as simple as plugging back.

The other approach to the plastic shutoff is the use of a low-viscosity plastic which is put in place under a packer by the use of comparatively high pressures. With the equipment now available, this has several distinct disadvantages. One fear of most operators is that the tool is very apt to be cemented into the hole. The high pressures involved in this method are also very apt to cause the plastic to channel into weak zones which may be fractured.

A few months ago, in an effort to overcome the adverse effects of the water entry into the air-drilled hole, a technique was used which varied from the previous aeration, but which still falls within that general category. The basic difference lies in the amount of fluid injected with the air and the addition of a special soap to the lime water being injected. We don't know yet whether the method is economical, but we are sure we can get the desired results.

We are familiar with two jobs which used what we shall call "mist-soap" drilling. In one case, the well was taken from 6,600 ft. to 9,650 ft. with a marked increase in penetration rate over water drilling. In another area, a well was taken from 5,000 ft. to 7,000 ft. with no appreciable increase in penetration rate, but excellent mechanical results, and a 50 per cent saving in bits.

From what little experience we have had with "mist" drilling, it appears that in almost all cases the penetration rate will fall in between the rate for water and for air, generally being closer to the water curve. The improvement in bit life will generally be about half of that obtained with straight air.

In both cases, the volume of lime water injected was reduced to around 15 to 20 g.p.m. and soap was added at the rate of ½ to 1 gal. per hour. In both cases, the hole was apparently kept completely clean, and normal operating pressures were kept in the 200 to 300-psi. range.

It is, of course, too early to make a definite statement concerning this technique, except to say that it shows very encouraging possibilities.

Very probably a variation of this technique might be the injection of a dry soap and anticorrosion material, making use of the formation water, itself, to clean the hole.

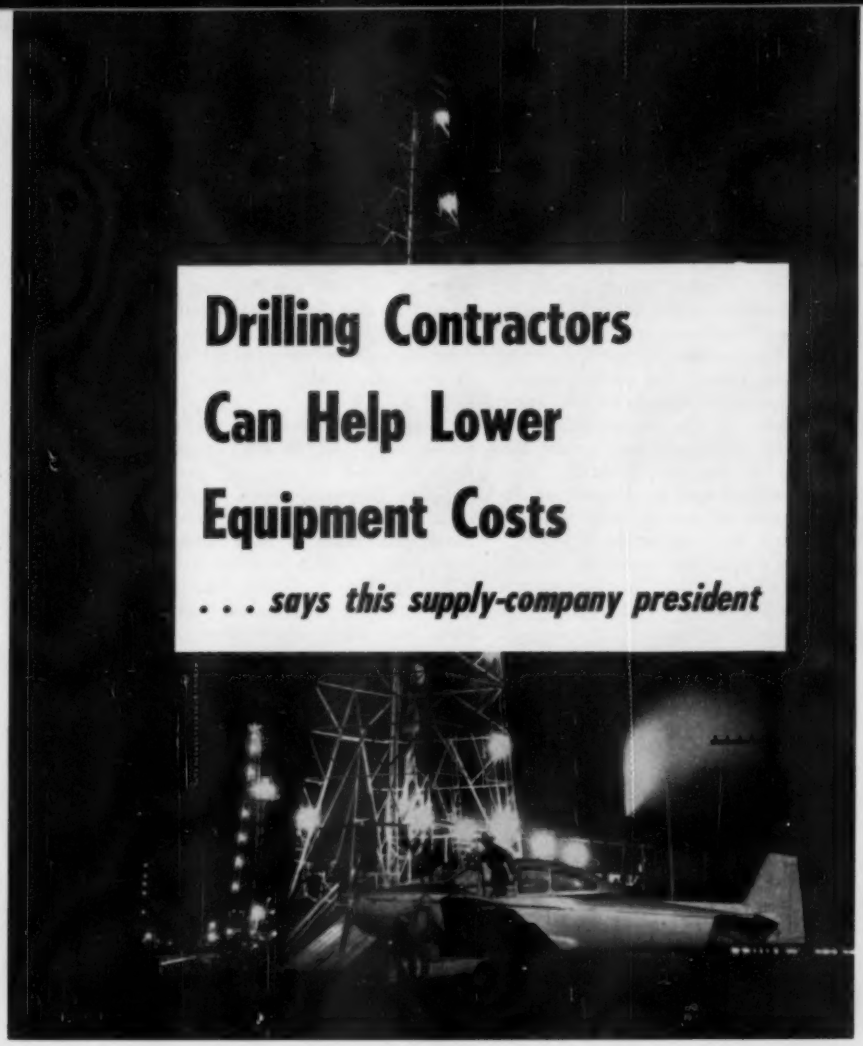
Cataloging . . . Work on cataloging is continuing, and the records are approaching the point where, at least in the Permian and Delaware basins, they can be quite helpful to those contemplating air or gas drilling.

These records, which are being assembled and are available at the office of Technical Drilling Service in Midland, include formation logs of air-drilled wells, electric logs, well-record cards, and all other available information.

From these records, information as to where water has been encountered is passed on to those working on water location, and water shutoff. All this information is available on request, but any request for information should pinpoint the location rather than describe it by general area. **End.**

Esso Research Plans New Facilities

SHOWN HERE pointing out features of the new laboratories is Dr. A. P. Hewlett, vice president of Research & Engineering Co. With him viewing the model are representatives of the Morristown, N. J., Chamber of Commerce. The facilities will be built in the Florham Park, N. J., area, on a 675-acre site. The buildings planned initially will accommodate between 800 and 1,000 employes. The company's main facilities are at the Esso Research Center in Linden, N. J., a 19-building, 75-acre site.



Drilling Contractors Can Help Lower Equipment Costs

. . . says this supply-company president

"We need the drilling contractor's understanding of our problems and we need their cooperation to try and reverse the trend of expensive and sometimes foolish practices of services that exist . . . It is worth while to you to cooperate with the supply and service companies which are trying seriously to correct them."

By Rainey Elliott

THE SERVICE companies, oil-field manufacturers, and supply companies, which make up the Petroleum Equipment Suppliers Association, take a great deal of pride in the things they have helped to develop and design for the drilling contractor.

The members of this association represent a multibillion-dollar industry. Capital funds invested in modern research laboratories, plants, warehouses, tools and machines, approximate $1,300,000,000. We compositely employ over 9,000 engineers giving full time to inventing and improving equipment and furnishing technical assistance in the use of services and tools. Add to this supply companies with warehoused inventories in a thousand field stores representing a capital investment in excess of a billion dollars, then add 23 service companies with technically trained and experienced specialists to perform the many special needs to drill and complete an oil well in this modern day.

Drilling contractors are one of the biggest single purchasers of our goods and services. The nature of your operation requires special tools, and quite often sudden service. Since you are such a large purchaser, strong competition and a great flood of service have been built up in the oil-well-supply industry. Due to this competition, extravagant practices have been allowed to grow and this has proven expensive for all concerned. The margin of profit earned in our industry is inadequate. As an industry we earn the small average dividend of 1.74 per cent of our total income dollar. On the other hand, the average earnings plowed back into the building up of the companies to properly serve the oil industry is 4.76 per cent of our income dollar.

We need the drilling contractors' understanding of our problems and we need their cooperation to try to reverse the trend of expensive and sometimes foolish practices of service that exist.

Less and less does the tool pusher or the contractor come into the supply store. A tool pusher may give an order for 10 lb. of rags to a salesman to be delivered that day or the next, while he himself may make one or two trips into the town where the store is located, the same day. The supply man is willing to take this order and in some cases deliver it as far as 50 to 70 miles away, because he hopes it will lead to more profitable orders. Many fruitless trips are made by sales and service people due to poor planning.

Now, certainly we do not propose that you can correct all of these matters that increase our cost of doing business, but we do point out that it is worth while to you to cooperate with management of the supply and service companies who are trying seriously to correct them.

I do not suggest that field services to your rigs should be discontinued; neither do I suggest that all field sales calls should be discontinued. You are entitled to good service because of the amount of money you spend with us to carry on your operations. You and we both are entitled to good intelligent field sales calls which should be designed to introduce new items, new applications, and gather information for a better-rounded inventory at the supply base. By your being conscious of our problem of extravagant servicing, I am convinced there are many trips that your representatives can

The author is president of Jones & Laughlin Supply Division, Tulsa. Article is an abridgement of a talk presented at the seventeenth annual meeting of the American Association of Oilwell Drilling Contractors in Tulsa, October 13-15, 1957.

eliminate on the part of the supply and service man.

More frequent stops into the store at your supply base can accomplish a great deal in learning of new items and, certainly, reduce the frequency of rig deliveries. We can do a lot in our respective organization by insisting that our representatives have a legitimate reason for the call that means the valuable time of your busy tool pusher.

Extravagant services do not by any means represent all of our increasing cost of sales to you—a very real problem is that of trade-in material on the purchase of new machinery. It is my understanding that this has been a matter of considerable concern to drilling contractors. When you press your supplier to accept a trade-in of junk or unusable machinery or to give a trade-in allowance far in excess of the actual value of usable machinery, you will no doubt pay for it one way or another sooner or latter.

Individual talks, trade-journal editorials, and papers given by officials have pointed out bad practices we both engage in, and still we are going along in our daily business routines living with things that we know are not right. Likewise, in the suppliers' association district meetings are held, committees are at work—about 12 of them—on the different phases of our industry. There seems to be sufficient avenues to explore completely mutual problems of the contractor and the supplier and to place them squarely before the members.

An area vital to both of us and which has not had enough discussion or understanding is the matter of credit. The supply-house credit is historical, and as all good credit relations must be is of a very personal nature. Individual and corporate integrity is surely the keynote. If the keynote becomes sour because credit is extended without physical assets to follow along behind integrity, the result can be disaster for one party and serious injury to the other. Supply-house credit is designed and put into practice to augment only regular and normal sources of capital borrowing. There is no need to dwell on the virtues of a good credit relationship between you and your supply sources for it has been a real instrument to many in developing a successful business. There is a need, however, for a better understanding of the limits of supply-house credit extension.

Unfortunately, any one company cannot have at all times large funds for credit extension. Usually a sincere business conference will present this fairly, and it should be readily understood. This is entirely different from the contracting company with considerable resources and equity who propose unbusinesslike and unreasonable terms for credit. This is one point where we should understand each other better for our "loans" must be supported by the same business instruments and measures of security as those of any other business lending institution. This is not always readily understood by the contractor and quite likely most of the responsibility for a lack of understanding is on the doorstep of the supply house. Our credit officials are well qualified in many cases to advise with you on credit and financial matters.

Today's drilling operation is so highly technical that its resemblance to drilling a well even 15 years ago is very slight. The many technological changes have made it necessary that well-trained and highly educated engineers be brought into your organization.

Technicians are not confined to the actual mechanical and field operation but are needed in your offices for general management and, certainly, in frequent contacts with engineering departments of producing companies.

Our complicated system of doing business requires management to become specialized in many areas and such is also the case in the general supply industry. We must have more technically trained sales engineers to properly present to you improved equipment and techniques. Naturally this type of personnel has increased your employment costs, and, in turn, our employment costs greatly.

As we see it, the policies we lay down for our operations now will prove to be very far reaching in the oil picture that lies ahead. Economists and statisticians forecast an ever-increasing dependence on oil and gas in the total energy picture, worldwide.

Bringing this down to the United States only and to the number of wells that will be required to supply our own domestic needs I quote the data below from a study by Chase Manhattan Bank of New York. This study reflects data secured from the U. S. Bureau of Mines, the American Petroleum Institute, oil trade journals, and other associations in the industry.

It is quite obvious that our potential for the next 10 years is a real challenge. There will be slack periods, but with the increase in industrial demand, population increase and a greater portion of the total energy requirements, we can expect consistently good business in the drilling and supply industry.

Without a fair profit, the over-all oil industry will suffer because we will not have funds to continue research and development, and place the goods in inventories for the daily conduct of drilling and producing operations.

	Thousands of wells			
Drilling—	1956	1961	1966	Change 1966 from 1956
Total wells drilled	58.2	72.0	87.0	+49.5
Oil wells drilled	31.2	39.0	45.0	+44.2
Exploratory wells drilled	16.2	20.5	24.0	+48.1
Dry holes drilled	22.0	28.0	35.0	+59.1
Total producing oil wells	540.0	620.0	680.0	+25.9
Average depth all wells (feet)	4,050	4,350	4,600	+13.6

SUPPLIERS HAVE BIG STAKE IN OIL

Petroleum Equipment Suppliers Association

Capital funds in research labs, plants, warehouses, tools, machines.....$1,300,000,000

Engineers full time, inventing and improving equipment, furnishing technical assistance in services and tools.....9,000 men

Capital investment in warehouse inventories in a thousand field stores.....$1,000,000,000

Add, 23 service companies with technically trained & experienced specialists.

Margin of Profit in Petroleum Equipment

This industry earns the small average dividend of 1.74 per cent of total income dollar. On the other hand, average earnings plowed back into building up of the equipment companies to properly serve oil industry is 4.76 per cent of their income dollar.

"...based on Visco paraffin-removal experiences such as these, other producers should be interested in this method..."

THE SITUATION: Gun barrel contained 84 barrels of paraffin, 28 barrels of oil, plus water-wash.

WHAT WAS DONE: 10 gallons of Visco 921 Paraffin Dispersant in 10 gallons of crude was put into the gun barrel. Vessel was rolled for two hours with an exhaust hose from just above the water-oil interface. 14 bbl./day well on the lease was left running—no down time.

WHAT HAPPENED: Paraffin content of gun barrel cut from 84 barrels to 30 barrels. Only 0.2% paraffin could be ground out of oil on top of the vessel.

WHAT IT COST: $35.00 . . . No down time . . . No lost oil.

WHAT IT SAVED: Down time, one day = 14 barrels of oil . . . Tank cleaning bill . . . 56 barrels of oil recovered from paraffin . . . Estimated saving: $236.80.

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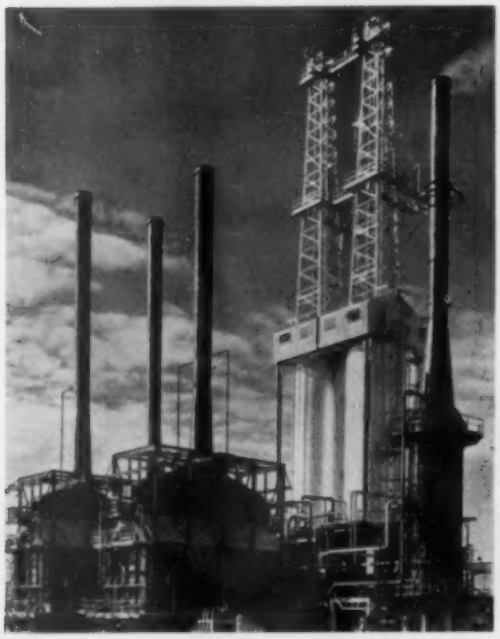
REFINERY FEED is solid gilsonite, obtained by filtering the solid from the slurry which arrives by pipeline.

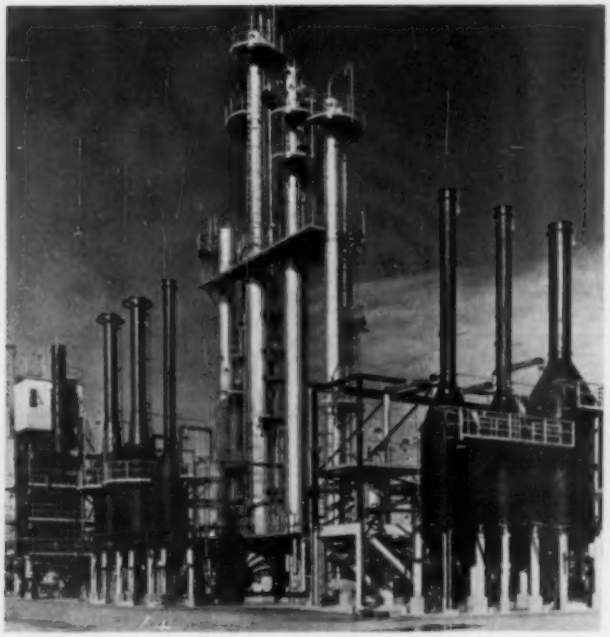
Where Gilsonite A Premium

Here's refining with a

By D. H. Stormont
District Editor



DELAYED COKING is the first processing step. Fresh feed is melted and charged to this unit.



COKER NAPHTHA is reformed to motor fuel in this Platformer, after nitrogen content is reduced in a hydrogenation unit.

AT ITS new refinery near Grand Junction, Colo., American Gilsonite Co. is producing about 1,300 bbl. daily of high-quality gasoline from an asphaltite which is solid at normal temperatures.

Charge stock for the unique plant is gilsonite, an unusual mineral made up of about 50 per cent resinous and 50 per cent asphaltic materials. The ore is mined from deep vertical veins in eastern Utah. It is transported through a 72-mile pipeline in the form of a slurry containing about 65 per cent water (OGJ, Sept. 16, 1957, p. 189).

Refining is carried out via a delayed coker and two-stage catalytic reformer. Only finished products normally produced are motor fuel and high-purity metallurgical coke. The latter is not a byproduct as is usually the case; it yields as much income as the gasoline.

Processing is essentially the same as that carried out in such plants operating on crude-oil streams. In two respects, however, processing is different. First, the coker is operated to yield a maximum of coke. The second difference stems from the fact that gilsonite is rich in nitrogen-base materials (about 4 per cent).

Because of the coker naphtha's extremely high nitrogen content, it must be subjected to severe hydrogenation . . . probably the most rigorous in any plant in this country.

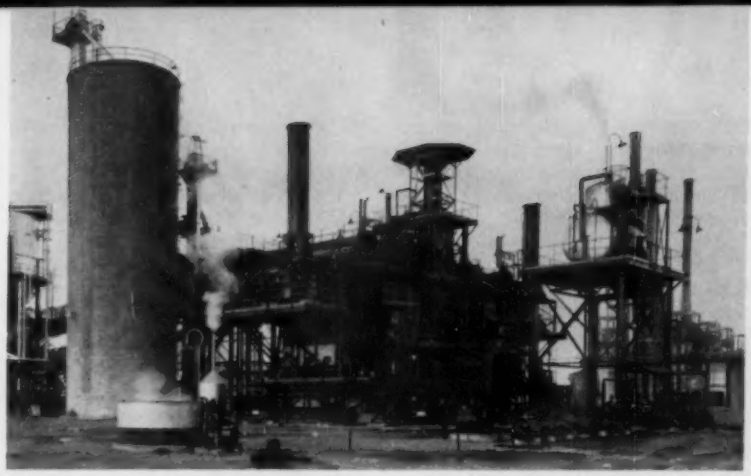
General processing . . . When the crushed ore arrives at the new $13,000,000 plant, the hydrophobic ore is separated from the water by vacuum filtration. The solid hydrocarbon then is heated to about 450° F., well above its melting point, by means of hot recycle oil from the coking unit.

Charge to the coker consists of 7,700 bbl. of recycle and 3,850 bbl. of melted fresh charge. Average gravity of the feed is 11°-13° A.P.I. Its viscosity ranges from 4,000 to 7,000 S.s.U. at 210° F.

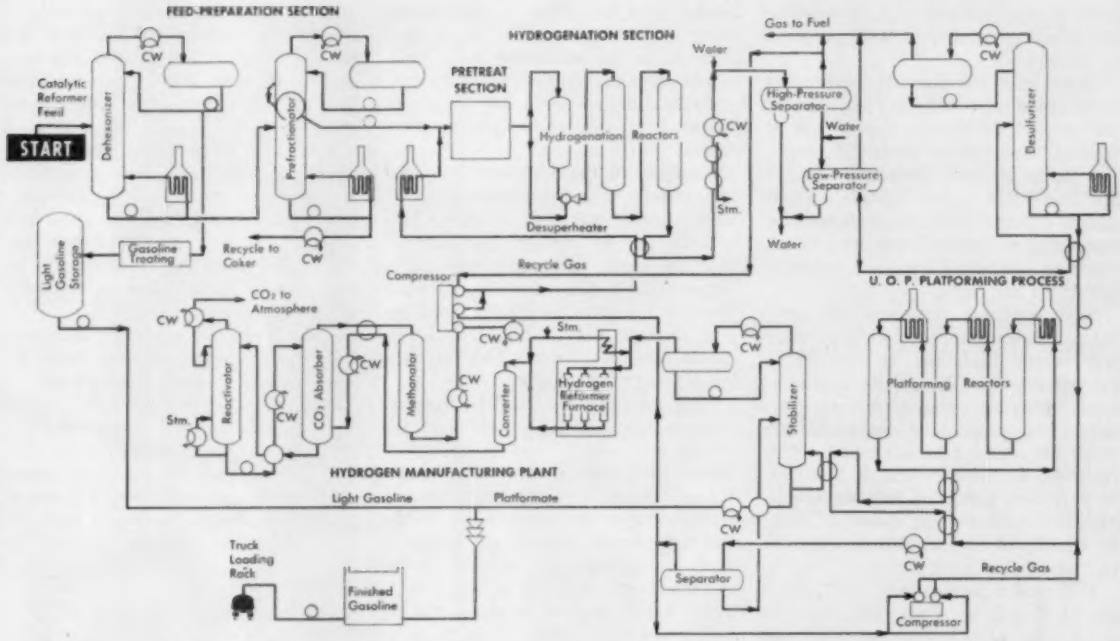
The feed is heated to about 910° F. in a direct-fired heater before being discharged to either of two coking drums. Overhead gas and vapors pass to a gas-recovery section. Only products coming out of this unit are gas and gasoline. Bottoms in excess of

Becomes Motor Fuel

little different twist

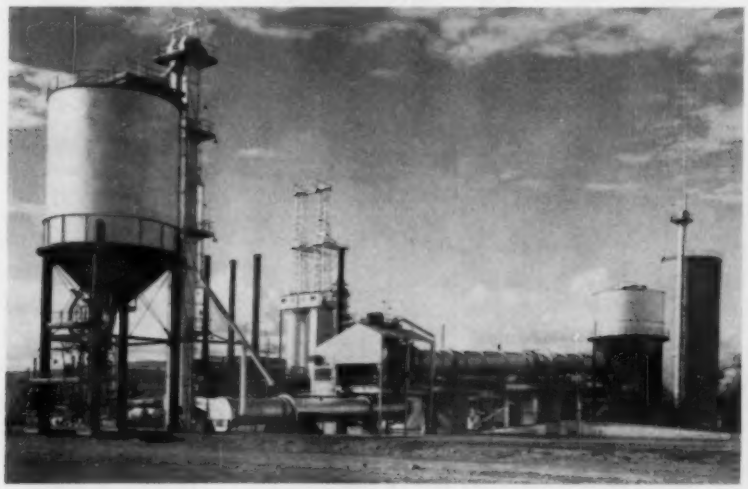


WASTE GASES from the calciner, where 275 tons of metallurgical coke is made from 350 tons of green coke, are burned in these two waste-heat boilers.



GASOLINE OPERATIONS start with fractionation of the coker naphtha (above). Then come hydrogenation and Platforming.

GREEN COKE is converted to high-purity metallurgical coke in this calciner (below). This is the first plant to produce and calcine coke at the same location.



recycle requirements are burned as fuel oil, but can be sold as residual fuel.

A gas-oil side cut is thermally cracked at 985° F. and recycled to the fractionator. Vapors overhead from the fractionator are condensed and passed through a separating-absorption-stabilization section. Gas from the absorber flows to the plant fuel-gas system. Stabilized coker naphtha is charged directly to the feed-preparation section of the cat reformer.

In the feed-preparation section about one-third of the total naphtha feed is separated in a dehexanizer. This cut, hexanes and lighter, has a

high octane rating and does not require reforming. Thus after it is run through a treating section, where most of the nitrogen is removed, it is inhibitor sweetened and run to storage.

Bottoms for the dehexanizer go to a prefractionator, to a pretreating section, and then to the Unifiner section of the Platformer (see flow diagram). Reformate is blended with the light coker gasoline to produce high-octane motor fuel.

Unusual processing problems . . . As a catalytic reformer feed stock, the coker naphtha possesses some unusual characteristics. Laboratory tests during pilot-plant work showed a bromine number of 64, a nitrogen content of 3,000 p.p.m. (0.3 per cent by weight), and a sulfur content of 0.15 per cent by weight.

In contrast, the distillate from a delayed coker operating on high-sulfur, low-gravity California crude has a bromine number of about 20, some 225 p.p.m. of basic nitrogen, and 1.9 per cent total sulfur. Distillate from cokers charged with sweet crude run something as follows: bromine number 13, basic nitrogen 26 p.p.m., and total sulfur 0.1 per cent.

High nitrogen contents are seriously detrimental to product yields and octane numbers, as well as to the activity and life of the platinum-type reforming catalyst. Nitrogen removal is a much slower reaction than those for olefin saturation and sulfur removal. Because of this it is necessary to use severe processing conditions—conditions just short of those in which an appreciable amount of hydrocracking occurs.

Difficulties anticipated, and cared for in the design units, included: (1) Feed-stock fouling by gumming and coking when the naphtha is heated to usual hydrogenation reaction temperatures; (2) insufficient reformer hydrogen for the desired hydrogenation reactions; and (3) the unusual hydrogenation severity required.

. . . Hydrogen requirement for essentially complete olefin saturation and nitrogen and sulfur removal is more than 600 cu. ft. per barrel of feed. The Platformer supplies from 30 to 70 per cent of this need when operating with fresh reforming catalyst. Hydrogen production at the end of a run, however, may be less than half that at the start.

The deficit was taken care of by the installation of a Girdler hydrogen plant.

Hydrogenation stage . . . Bottoms from the dehexanizer are fed to a prefractionator. There a 200°-400° F. product is prepared as charge for the hydrogenation phase. End-point control is desirable as this decreases coke laydown in the reformer.

It also is desirable to reduce the heat load of the hydrogenation-unit recycle gas furnace as much as possible. To do this the feed is prepared at its bubble point by withdrawing a side cut from the prefractionator and dropping it into a surge drum from which the hydrogenation unit takes feed. The surge drum is an integral part of the column.

About 10 per cent of the feed-preparation section charge is a fraction in the 400°-500° F. boiling range. This material as a tower bottom is heated in the reboiler to a temperature close to that where excessive gum formation is believed to occur. To hold the reboiler return temperature to the minimum value consistent with the highest side-cut temperature requires that the tower be operated at near atmospheric pressure.

. . . Feed to the Unifiner, i.e.—the prefractionator side cut—is split before entering the first reactor. This is necessary to prevent the heat of reaction from increasing the outlet temperature to the point where hydrocracking becomes significant. Feed not sent through the first reactor is injected through a mixer into the outlet of the first reactor.

Effluent from the third hydrogenation reactor exchanges heat with the recycle-gas stream and passes to a steam generator where it produces 150-psi. steam. From the high-pressure separator (see diagram), most of the gas flows to the recycle-gas compressors. To prevent the buildup of undesirable contaminants in the recycle gas, a small portion flows to the refinery fuel-gas system.

Liquid from the low-pressure separator is run through a desulfurizer where ammonia (2 to 3 tons daily) and hydrogen sulfide are stripped out. It then goes to the Platformer. Reformate from this unit is stabilized and run to storage. En route a stream of light coker gasoline (from storage) is injected to adjust the vapor pressure and distillation to the specifications of finished gasoline.

"You say your boss, the chief geologist, selected this design then invited you on his hunting trip?"

Hydrogen-manufacturing plant . . . Butane and lighter gases from the stabilizer serve as feed for the hydrogen plant. If necessary this feed may be supplemented by either excess gas from the hydrogenation unit or by L.P.G. Highlighted, hydrogen is produced as follows (see flow diagram).

The feed is caustic scrubbed in two contactors, water washed, and then treated in an activated charcoal bed to remove all traces of sulfur compounds. After treating, the gas is mixed with superheated steam and passed into the hydrogen reformer furnace. Over a nickel catalyst the feed and steam react at high temperatures to form hydrogen and carbon monoxide.

Effluent from the furnace is quenched with steam and condensate. It then goes to the shift converter, where steam and carbon monoxide react to produce more hydrogen and carbon dioxide. The latter then is removed by absorption in a monoethanolamine solution.

Gas from the absorber is heated by exchange with effluent from the converter and passed into a methanator. There a highly active nickel catalyst converts any remaining CO and CO_2 to methane. After compression in two stages, with excess reformer hydrogen joining the stream at the suction to the high stage, the gas joins the Unifiner recycle gas stream.

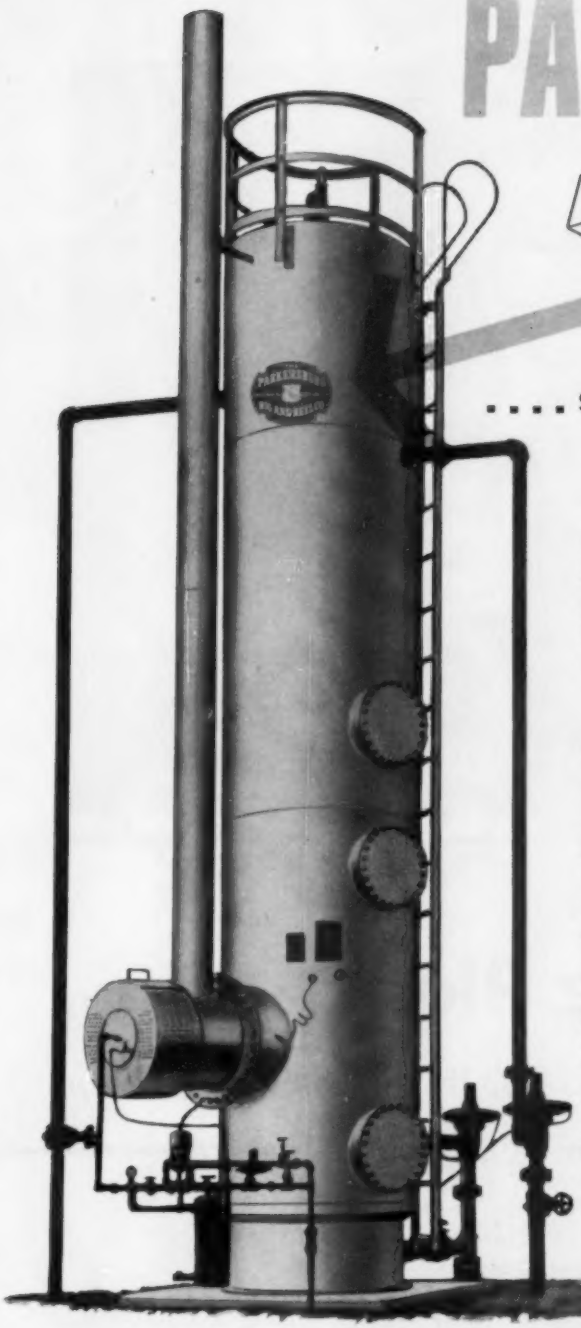
Coke calcining . . . The American Gilsonite plant is the first to produce and calcine coke at the same location. The 275 tons of metallurgical coke produced daily is of exceptionally high purity, containing less than 0.25 per cent sulfur.

In the calciner, hot volatile and combustible materials are driven from the green coke as it moves down a sloping, rotating kiln. These waste gases serve to make the entire refining operation even more independent of an outside fuel source. They are burned in two waste-heat boilers which are rated at 43,000 lb. per hour of 150-psig. saturated steam.

Acknowledgment

Much of the material for this article was taken from a company report prepared by C. W. Matthews, process foreman at Grand Junction. Appreciation is expressed to American Gilsonite Co. for making this material available for publication.

PARKERSBURG



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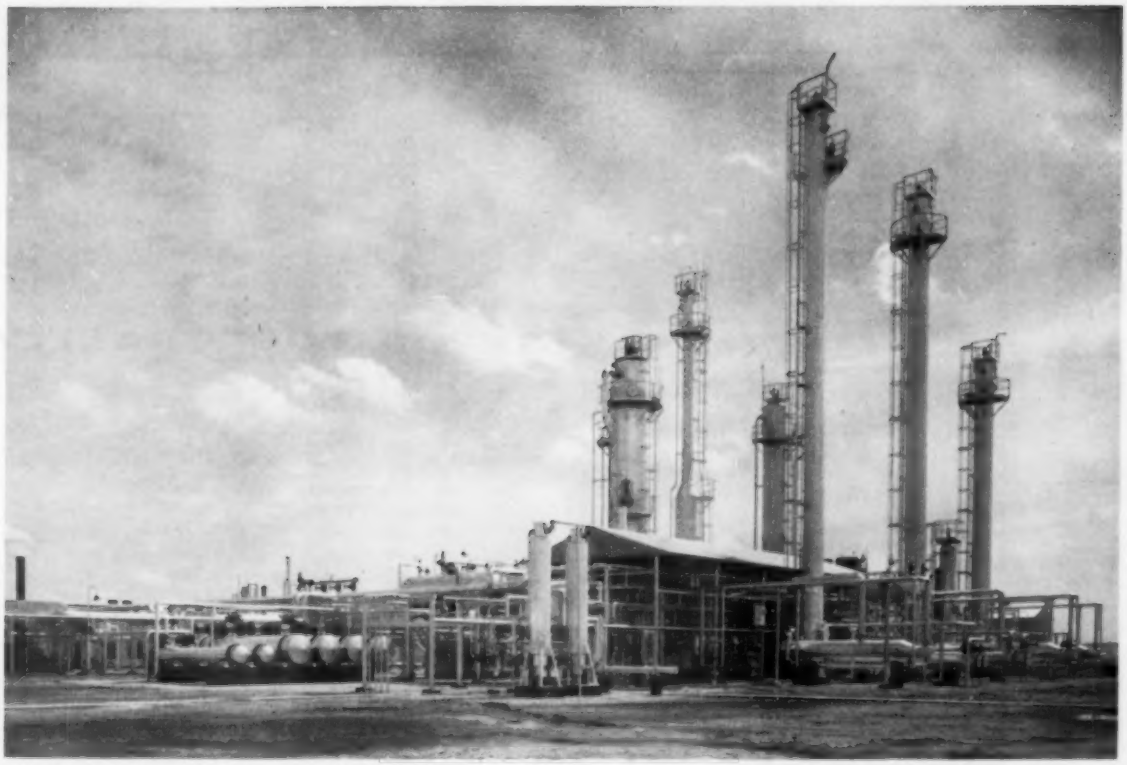
THE PARKERSBURG RIG AND REEL CO. PARKERSBURG WEST VIRGINIA



A LOW-PRESSURE and high-pressure gathering system serve this plant which is located in Harper County, Kansas. All the columns are equipped with perforated trays.

Spivey Gasoline Plant, operated by Magnolia, processes 30,000,000 cu. ft. per day. Automatic safety shutdown and alarm system is important feature

By John C. Reidel
The Oil and Gas Journal Staff

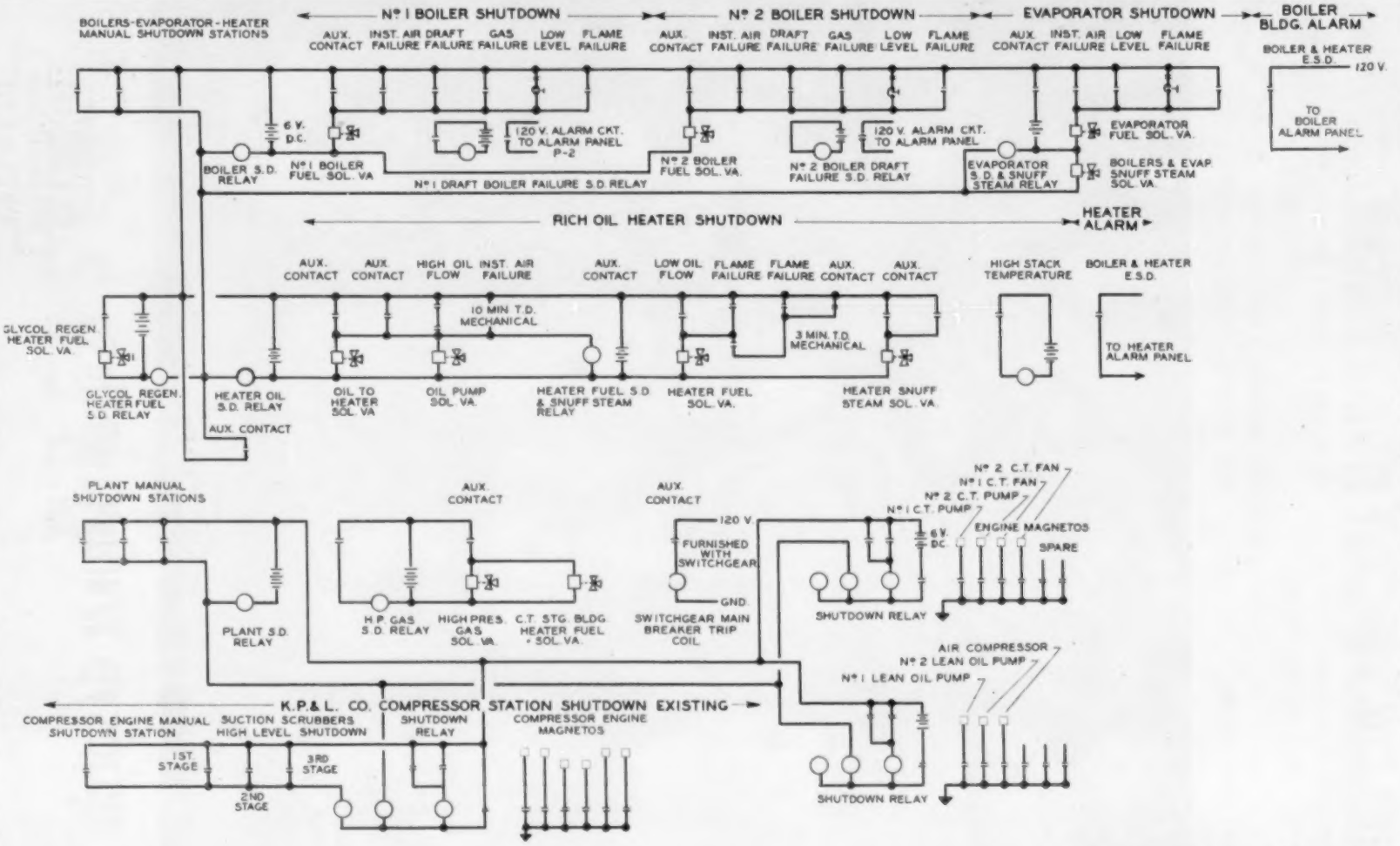
THE SPIVEY plant, located at Attica, Kans., has 58 owners, with Magnolia Petroleum Co. as operator.

● The plant-process cycle is largely conventional and employs an absorber and contactor-reabsorber. The fractionation section consists of deethanizer, depropanizer, and debutanizer. All columns are equipped with perforated trays. Residue gas is dehydrated and goes to Kansas Power & Light Co. The compressor facilities and one of the gas-gathering systems are owned by Kansas Power & Light Co. The plant was built by Dresser Engineering Co., Tulsa.

● An interesting feature of the Spivey plant is the automatic shutdown and alarm system. This incorporates Magnolia's prior experience with safety shutdown systems and insures that all possible hazards have been provided for by including an appropriate safety device. Three plant emergency shutdown stations are provided and two boiler and rich-oil heater emergency shutdown stations. The steam-plant boiler and evaporator and the heater are provided with various safety shutdown devices. The shutdown schedules for these three pieces of equipment will be given later.

1. SPIVEY PROCESSING

Two gas-gathering systems serve the Spivey plant: (1) the high-pressure systems, operated by Kansas Power & Light Co., supplies gas to the processing plant at a minimum pressure of 500 psig., and (2) the low-pressure system, operated by Magnolia Petro-



AUTOMATIC SAFETY SHUTDOWN AND ALARM SYSTEM OF SPIVEY GASOLINE PLANT

THREE plant emergency shutdown stations and two boilers and rich-oil heater emergency shutdown stations are provided. In addition, safety devices are provided to shut down automatically boilers, evaporator, and rich-oil heater in event of unsafe condition or upset.

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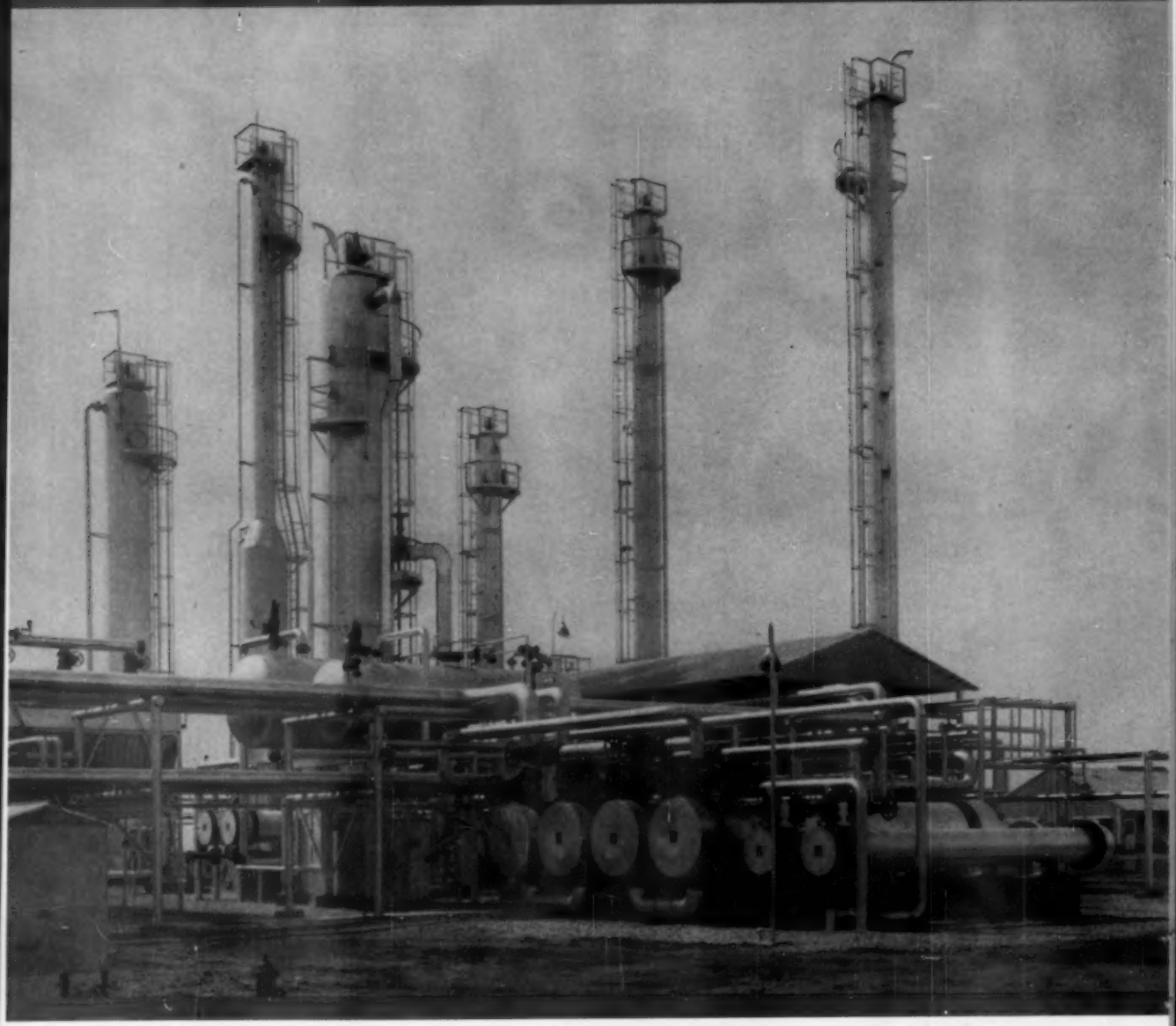

Located at Attica, Kansas, this plant handles some 30,000,000 s.c.f.d. of gas.

An unusual feature of this plant is the automatic shutdown and alarm system developed by engineers of Dresser and Magnolia Petroleum Company, plant operator for its 60 owners.

While the process system employed is considered conventional — the plant is extremely attractive from any angle and careful attenion was given to access to all stations.

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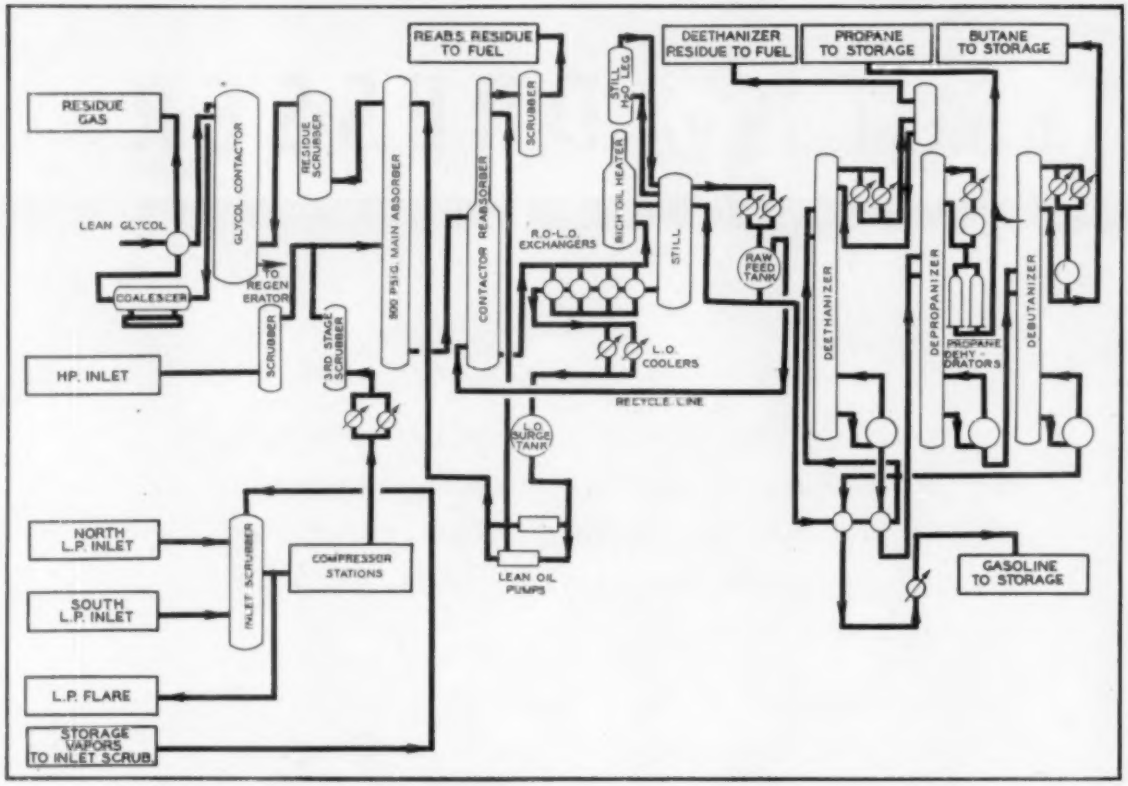


PROCESS SCHEME is largely conventional, employing a main absorber and contactor-reabsorber.

leum Co. The low-pressure casing head comes into the compressor station at about 5 psig. and leaves the third stage of compression at 500 psig. The inlet gas from the two systems then goes to the main absorber (diagram). The low-pressure gas averages 0.8 gal. per M.c.f. of gasoline. Total extraction is 1.5 gal. per M.c.f.

Absorption

Commingled inlet gas is contacted countercurrently with lean oil in the main absorber. Residue gas goes through the glycol dehydration unit and into the K. P. & L. transmission line. Absorber efficiency is almost 100 per cent pentanes-plus, 99.5 per cent total butanes, and 70 per cent propane.

Contactor-reabsorber . . . The high-pressure rich oil from the main absorber is flashed at the midsection of the contactor-reabsorber unit. Lean oil is pumped in at the top and uncondensed vapors from the raw-feed tank are fed in the bottom section. A flow-recording ratio controller ratios the lean oil entering the reabsorber to the residue gas leaving the reabsorber residue scrubber. The contactor-reabsorber is operated so that rich oil leaving the unit is partially stabilized, with methane and ethane coming out in the reabsorber residue gas which goes to plant fuel.

Rich-oil heater and still . . . Rich oil from the contactor-reabsorber goes through the lean-oil-to-rich-oil exchangers, then to the direct-fired rich-oil heater where it is raised to 500° F. From the rich-oil heater the hot oil goes to the still. The hydrocarbons are stripped with steam and partially liquefied in the still overhead condenser to make raw-feed product. Vapors from the raw-feed tank are recycled to the bottom of the contactor-reabsorber. The second and third-stage discharge scrubber condensates from the compressor station are fed into either the raw-feed tank or contactor-reabsorber unit.

Fractionation

The deethanizer feed pump takes the liquid from the raw-feed tank and pumps it through the debutanizer bottoms-to-deethanizer feed and deethanizer bottoms-to-feed exchangers. Vapor from deethanizer reflux accumulator gas to plant fuel. Deethanizer bottom product goes through heat exchange and is fed to the depropanizer.

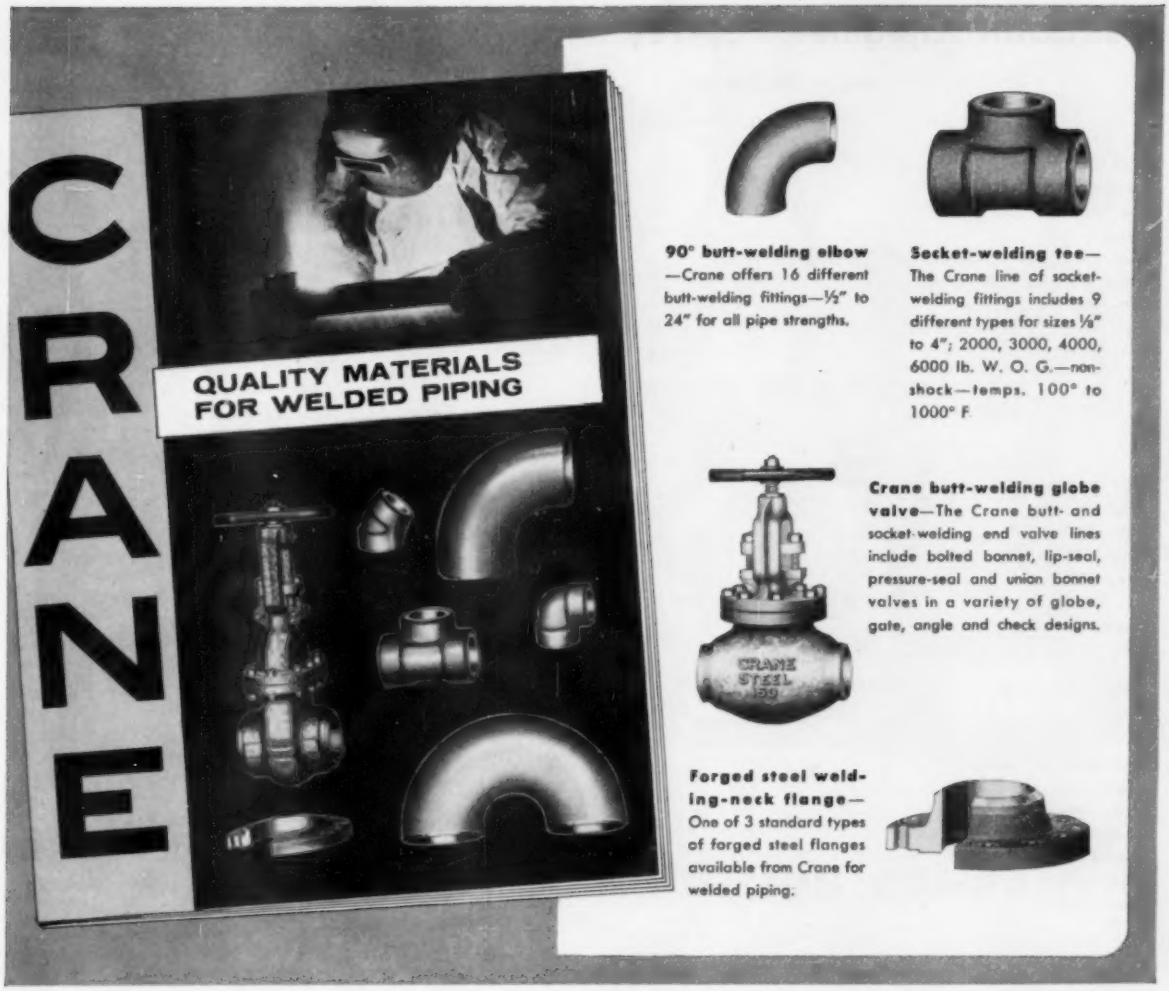
The depropanizer makes commercial propane as the overhead liquid product. The propane is dehydrated and goes to storage. The debutanizer makes mixed butanes overhead liquid product and natural gasoline as bottom product.

Steam Plant

The plant utilities equipment includes two water-in-tube boilers equipped with superheaters and rated at 20,000 lb. of steam per hour. There is also one locomotive-type boiler which is a minor source of steam supply. This boiler is used as an evaporator (fire-tube boiler). The evaporator produces the makeup water required by the water-tube boilers. A spray-tube deaerating heater is also included in the steam plant.

2. SHUTDOWN AND ALARM SYSTEMS

The Spivey plant shutdown and alarm systems consist of: (1) plant emergency shutdown system; (2) boiler and rich-oil heater emergency shutdown system; (3) boiler, evaporator and rich-oil heater safety shutdown devices; (4) process alarms; (5) compressor protection; and (6) high-pressure inlet-gas shutoff. The plant emergency shutdown and the boiler and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Shutdown schedule of Spivey units

BOILER SHUTDOWN

	Shutoff burner and power gas	Snuff steam	Lights trouble lights	Sounds air whistle
Draft failure	Yes	No	Yes	Yes
Instrument air failure	Yes	No	Yes	No
Gas failure	Yes	No	Yes	Yes
Flame failure	Yes	No	Yes	Yes
Plant emergency shutdown	Yes	Yes	Yes	No
Boiler emergency shutdown	Yes	Yes	Yes	No
Low water	Yes	No	Yes	Yes
High water	No	No	Yes	Yes
Power failure	No	No	No	No

RICH-OIL-HEATER SHUTDOWN

	Shutoff fuel gas	Shutoff oil flow valve	Shutoff rich-oil pump circ.	Turn on snuff stm.	Sound alarm	Light signal
High stack temperature	Yes	Yes	Yes	No	Yes	Yes
High oil flow	Yes	Yes	Yes	No	Yes	Yes
Low oil flow	Yes	No	No	No	Yes	Yes
Flame failure	Yes	No	No	No	Yes	Yes
Power failure	No	No	No	No	No	No
Air failure	Yes	Yes	Yes	No	Yes	Yes
Heater emergency shutdown	Yes	Yes	Yes	Yes	Yes	Yes
Plant emergency shutdown	Yes	Yes	Yes	Yes	Yes	Yes

EVAPORATOR SHUTDOWN

	Shutoff burner and power gas	Snuff steam	Lights trouble lights	Sounds air whistle
Instrument air failure	Yes	No	Yes	No
Flame failure	Yes	No	Yes	Yes
Plant emergency shutdown	Yes	Yes	Yes	No
Boiler emergency shutdown	Yes	Yes	Yes	No
Low water	Yes	No	Yes	Yes
High water	No	No	Yes	Yes
Power failure	No	No	No	No

rich-oil heater emergency shutdown systems are completely battery powered.

(1) Plant Emergency Shutdown

The three-plant emergency shutdown switch stations are located respectively at the plant office, near the fire pump building, and at the north end of the process row.

Activation of any of these switches leads to:

(a) Grounding of engine magnetos on compressor, generator, lean-oil, and cooling-tower pumps, and cooling-tower fan. When compressor engine stops, low oil pressure closes fuel-gas shutoff valve. Fuel gas to boilers, evaporator and rich-oil heater is shut off. Snuff steam is opened into fire boxes. Also fuel gas to glycol regenerative heater is shut off.

(b) High-pressure inlet gas is shut off.

(c) Main circuit breaker is opened by trip coil, shutting off plant power.

(2) Boiler and Rich-Oil Heater Emergency Shutdown

Switch stations for shutting down boilers, evaporator, and rich-oil heater only are located beside the plant emergency shutdown switch stations at the fire pump building and north end of process area. The boilers and heater will shut down in the same way as when plant emergency shutdown switch is operated.

(3) Boiler, Evaporator and Rich-Oil-Heater Devices

Safety devices are provided to shut down automatically boilers, evaporators and rich-oil heater, in event of unsafe condition or upset. These shutdown devices are powered by 6-volt dry-cell battery or are pneumatic. One exception, however, is the flame failure device which requires 120 volts a.c. Operation of a shutdown device is coupled with sounding of an air horn and the bright glow of an indicator light to show cause of shutdown. Accompanying tables give the shutdown schedules for the rich-oil heater, boiler, and evaporator.

(4) Process Alarms

There are high-level alarms on the deethanizer reflux accumulator and reabsorber residue-gas scrubber (the vapors from these vessels go directly into the fuel-gas systems). Alarm (air horn) is activated by a pressure-actuated electric switch connected into the liquid-level control. A light on the fractionator panel board indicates which vessel has the high level.

High and low-level alarms and lights are provided for the lean-oil surge tank. Too low a level here would be bad for the lean-oil pumps; too high a level would create danger of flooding the still and getting oil into the fuel system.

An air horn will also sound when purchased power supply fails. This is located at the laboratory and auxiliary building.

The deaerating heater is equipped with a low-level alarm, operated by pressure-actuated electric switch, to insure that the boiler feed pump will not lose suction. In connection with this, a pressure switch is located in the boiler-feed-pump discharge line. This switch automatically starts the boiler feed pump (electric-motor-driven) when boiler-feed-water pressure drops below 250 psig. Similarly, the deaerator-feed-water line is equipped with a pressure switch to start the deaerator feed pump when line pressure drops to 5 psig.

(5) Compressor Protection

Low oil pressure, high water temperature, and overspeed switches on each compressor engine grounds the magnetos to stop the engine, turn off fuel gas, and vent the fuel header. The engine magnetos are also grounded by float switches on the low-pressure inlet scrubber and second and third-stage suction scrubbers. These float switches are actuated by high liquid level. Also, as mentioned, plant or compressor emergency shutdown grounds the magnetos when activated.

(6) High-Pressure Inlet Gas Shutoff

The high-pressure inlet gas is shut off by plant emergency shutdown switches, as noted. It will also shut off if the pressure downstream of the valve falls below a predetermined minimum (i.e., in case of a blowout in line downstream).

Acknowledgment

Appreciation is expressed to J. F. Todd and T. H. King, of Magnolia Petroleum Co., and to J. W. Pearce, of Dresser Engineering Co. for their help in preparation of this article. G. E. Cox is district superintendent for Magnolia at Great Bend, Kans. L. P. Dowden is plant foreman and D. W. Pierce is plant engineer for the Spivey plant at Attica.

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Free Piston Has Quick Payout

- **Here's how it is increasing gas production up to 36 per cent and liquid production up to 23 per cent. Payout varies from 1 to 9 months, with an average of about 4 months.**

By Norman F. Brown

PRIMARILY, the purpose of the free piston in a well is to provide a solid interface between the base of a column of liquid being lifted out of a well and the gas that is doing the lifting.

This article is concerned with the periodic lifting of slugs of accumulated liquid from gas wells using the gas pressure. Applications discussed are:

1. Production of gas and liquid through tubing string only. In one area gas production was increased 36 per cent and liquid production increased 23 per cent. Paraffin problems have been eliminated
2. Production of liquid from tubing and gas from casing. This arrangement gives highest gas flow and the casing annulus serves as a long separator to remove liquid from the gas.

Costs of free-piston installations range from $900 to $1,600 and are paid out in an average time of 4 months.

Gas-Well Operations

Before the introduction of free pistons, gas wells were usually completed with a tubing string whose size was selected from a consideration of the factors:

1. Small enough to provide sufficiently high stress velocities to carry out the water or condensate expected.
2. Not small enough to create a sufficiently severe pressure drop to reduce production unnecessarily.
3. Possibly to a lesser degree, initial cost.

The string was usually run with a casing packer near bottom and the annulus was very often left full of mud. The production of bottom water in these circumstances, given a high enough gas-stream velocity, was continuous in the form of a spray more finely dispersed towards the top and attended by varying degrees of difficulty and cost of separating it out at the surface.

In such a tubing string the pressure gradient due to the flow of gas alone is seldom a serious matter but the effect of the water dispersed inside the tubing is relatively large and presents a very different picture.

Pressure gradient . . . In the absence of reliable data, the best indication of what the total pressure drop over the whole tubing string really is might be obtained from a study of wells in which free pistons have been installed and where the productivity index is known. Then the increase in production of gas, and usually of water or condensate also, becomes a measure of the reduction in bottom-hole pressure and an indication of what the gradient must have been before installing the free piston.

Author is with the research department, Garrett Oil Tools, Inc., Longview, Tex. Paper presented at twelfth annual short course in gas technology, Texas A. and M. College, Kingsville.

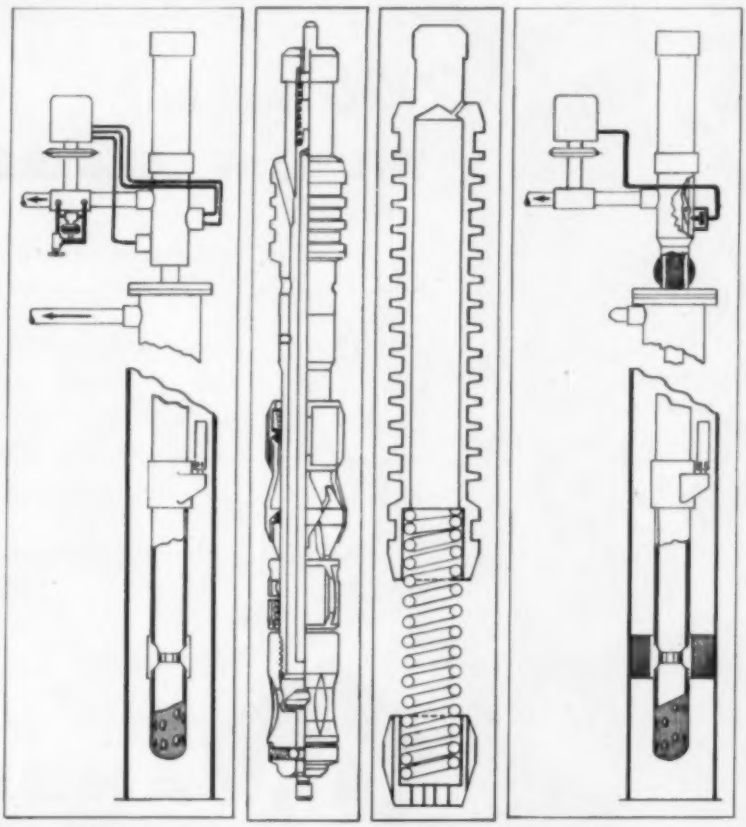

Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Introduction of free piston into gas well producing through tubing requires closing the well, as in Fig. 1. The type of free piston shown in Fig. 2 is best suited to low-gas-velocity wells. With higher gas velocity a much simpler unit, like that in Fig. 3, can be used. Liquid lifting is the sole duty of the tubing shown in Fig. 4.

We have records of hundreds of wells where gas production has been increased by widely varying amounts. However, the productivity indexes of gas wells that also make some water are seldom known; subject is of retrospective interest only after a free piston has been installed; therefore, we naturally have very few data on which to evaluate the pressure gradient in a tubing string due to a dispersed water column.

Loading and dying . . . The foregoing refers to gas wells producing their water **continuously.** If the gas flowing velocity decreases and becomes less able to lift water, the pressure gradient in the tubing then gets steeper and reduces the gas flow. So long as the formation is sufficiently competent, all that happens is that the bottom-hole pressure is raised, the production declines a little, and the pressure gradient in the tubing string is steeper from then on.

It will be obvious that as bottom-hole pressure rises and the pressure drop across the tubing string increases, a point will be reached where gradients will steepen rapidly and the well will load up and die. This occurrence is usually anticipated by shutting off the supply line and opening the well to atmosphere so that the enormous increase in velocity will literally purge the tubing string and reduce its pressure gradient.

Purging frequency . . . The economic optimum frequency of purging then becomes a compromise between gas-production loss due to the accumulation of water and the quantity of gas used to get rid of it. The water-lifting efficiency is low even though the gas velocity at the surface is very high and very impressive. The reason is that the pressure gradient in the tubing is affected by the increased gas flowing velocity and down at the bottom of the well where velocity is most needed, the gas pressure is not being reduced nearly as much as it is at the surface. With this condition, there is still a very large slippage loss in the lifting of the water, especially with the larger tubing sizes.

When blowdown frequency becomes stable, the cycle can be made automatic by various available types of controllers. At best, the flow-rate graph for such an installation has the shape usually known as "saw tooth." Where the delivery-line pressure is constant, the tubing-head pressure varies very little. The rising gradient in the tubing demands a rising bottom-hole pressure and a diminishing formation-to-hole differential. Production is reduced gradually until the next purge is made.

Use of Free Piston

To introduce a free piston into a gas well producing through tubing, it is nearly always necessary to close the well in to enable the free piston to fall to bottom. A typical installation of this kind is shown in Fig. 1.

Here we assume a typical set of conditions such as a 6,000-ft. well with 2-in. tubing and a packer set above the producing zone. Gas production has diminished from 500 M.c.f. to an average of 200 M.c.f. per day against a 400-psi. delivery line. The flow was previously switched to a blowdown line once a day for about 15 minutes to blow out some salt water and distillate to a pit. The free-piston installation here includes a flow-line separator, and a clock-controlled flow-line valve.

Once every 4 hours the flow-line valve is automatically closed and the free piston drops from its normal place of rest in the upper lubricator to the bottom. The time allowance is 20 minutes during which there is a rise in bottom-hole pressure.

Lifting pressure . . . On reopening the flow line the free piston is underneath a liquid accumulation in the tubing and starts upwards. The pressure difference necessary to lift the free piston with say 130 ft. of salt water above it is obtained from two sources.

First, prior to the free-piston installation, the flow of 200 M.c.f. per day at a mean pressure of about 450 psi. would have a velocity of about 4 ft. per second. In breaking through a dispersed water column without appreciable production of the water, the gas would have a total pressure drop comparable with that which, with a free piston, can lift all the water in the tubing at a similar velocity. The second source of additional power is, of course, the buildup due to the temporary shut-in.

The slug of water is then lifted as soon as the flow line is reopened. For any water to escape downwards past the free piston during the trip upwards, it would have to work down through the circumferential clearance against upwardly flowing gas at a higher pressure. For a 2-in. free piston weighing say 9½ lb. the pressure of the gas underneath the piston must be at leat $9\frac{1}{2}/\pi$ or 3 psi. (neglecting friction) greater than that of the fluids above it.

Consequently there is no loss other than the mere wetting of the walls of the tubing. To some extent the top of one slug will pick up the leavings of the preceeding slug and so on. It is certain therefore, that all of the water picked up at bottom is brought out at the top.

Friction loss . . . At the velocity of less than 4 ft. per second the friction loss for a water column 130 ft. long is less than 5 psi. so the total pressure drop across the slug and piston is of the order of 66 psi. The addition for gas-flow friction and free-piston friction will scarcely raise this figure to 70 psi. The weight of the gas column is about 60 psi.

Thus the total difference between bottom-hole pressure and top-hole pressure when the slug starts upward is about 130 psi. It increases and slug velocity decreases a little before it reaches the top because of more water coming in. Then it drops to a minimum of about 65 psi. when the free piston reaches the top and rises slowly to about 120 psi. again before the flow line is once again closed for the next cycle and the free piston dropped.

The falling velocity goes up over 20 ft. per second but diminishes according to the dispersal of fluid in the tubing and reaches bottom falling slowly through liquid; 6,000 ft. usually requires about 20 minutes.

In wells with high flowing gas velocities, the flow may be sufficient to hold the free piston in the head between cycles. Where it is not, the free piston is mechanically caught on its arrival, held and released, by the controller at the time the flow valve is closed.

Effect on production . . . It will be seen that the formation-to-well differential gradually decreases over each 4-hour period by what is virtually the static head of the liquid accumulation. The effect of a 60-psi. fluctuation on the productivity will depend on many factors outside the scope of this article but in most cases will be negligibly small compared with the effects of 24-hour or larger liquid accumulations prior to running the free piston, and can be reduced further.

It will also be obvious that if the cycle frequency is increased, the actual work of raising the liquid will have almost imperceptible effects.

Types of Free Pistons

Fig. 2 shows the type of free piston best suited to low-gas-velocity wells. It has an all-metal expanding packer to maintain an effective shut-off in spite of considerable variations in the roughness, roundness, diameter,

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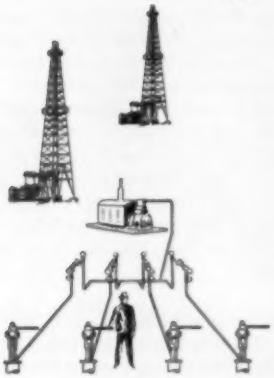

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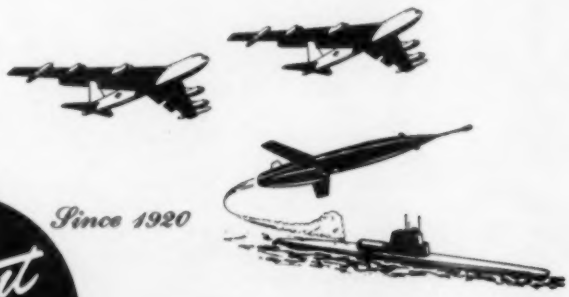

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and coupling concentricity of standard run-of-the-mill tubing. It has a bypass passage up its interior of the largest practicable area, and a valve which is opened when the unit strikes a buffer at the top of the well and closed when it strikes a stop at the bottom.

Simplest type . . . In wells where the gas velocity is considerably higher, a much simpler unit having no packer and no valve can be used (Fig. 3). The external surface is formed with a number of circumferential recesses and the outside solid diameter is as large as practicable. Tolerable dimensions are 1.900 in. for 2-in pipe and 2.320 in. for 2½-in. pipe. At time of installation, tubing gages are run. Broaches are available for easing out tight spots in tubing if necessary.

The upward gas flow against the counterflow of liquid adhering to the walls of the pipe produces turbulence and foam in each of the recesses of this piston and this contributes materially to the pressure gradient over the whole group. This reduces the gas flow necessary to maintain the 3-psi. pressure differential required to lift the free piston. This type is relatively light in order to minimize the gas velocity for lifting it and reduce the cushioning requirements at the top. Since all of the gas which passes this type of piston is going to the sales line in any case, the quantity is unimportant.

Disadvantages of the simple unit are:

1. It cannot fall so fast, having no bypass other than its external clearance, and so shut-in time allowances are longer.

2. It has to be run much oftener than the free piston that can pack off, in order to lift shorter slugs to minimize the velocity reduction during lifting.

Is effective . . . Nevertheless, it is equally true that the simple free piston brings out all of the liquid with which it starts off from the bottom. Also, the proportion of gas-oil dewatering jobs in which the velocity is adequate for this type is considerable.

The lowest velocity of gas flow that will bring this free piston up the tubing is roughly 9 ft. per second. It will be lower if the fluid contains oil-having properties helping it to adhere to the pipe walls and make foam or emulsion in the free-piston grooves. It will be higher with either all water or light distillate.

Field Cases

Turning now to typical examples, the first two cases are Pan American Petroleum Corp. gas wells producing from the Mesaverde formation in the San Juan basin:

Case 1. An open-hole completion with 5-in. casing at 5,300 ft., using 2-in. tubing and producing to a 550-psi. sales-line pressure. This well was blown to atmosphere at frequent intervals with an estimated gas loss of 343 M.c.f. per month. After installing a free piston, production improved by 30 M.c.f. per day on comparable delivery periods. On two separate occasions the free piston was removed leaving the automatic intermitter in service. On both occasions the well logged off in 3 days yet returned each time to the higher level of gas production when the free piston was replaced. Liquid produced averages 6 bbl. per day.

Case 2. A similar well's wastage was estimated to exceed its useful production when it had previously been blown for 30 minutes every day. But with the free piston the well was producing 2½ bbl. liquid and 335 M.c.f. per day. When the free piston was taken out to observe the effect, production fell to 156 M.c.f. by the third day but came back up to 350 M.c.f. on returning the free piston to service. Production then settled down again to 335 M.c.f. per day. In these cases the elimination of blowdown wastage was of primary importance and higher allowables were obtained.

Other cases . . . Table 1 shows reliable observations and records of 15 installations in the Mesaverde and 3 wells in Jal-Mat, N. M., all producing through tubing.

Before free-piston installation, liquid and gas production was checked, the latter by individual orifice meter over the latter 8 days of a stabilized production period of at least 3 weeks. After free-piston installations, measurements were made after restabilization at the new production levels.

Over these 18 wells the gas production was increased from 11,655 M.c.f. to 15,879 M.c.f. per day, an increase of 36.2 per cent. Of these only one shows less than 10 per cent improvement. Twelve range from 10 to 56 per cent, four range from 100 to 203 per cent and one shows 367 per cent.

Omitting 4 whose fluid production had been blown to waste, 14 show a total liquid production increase from 129.2 to 159.4 bbl. per day, a 23.4 per cent increase. Such an increase in liquid production obviously lowers the mean bottom-hole pressure, accounting for the increased formation-to-hole differential.

Low pressures . . . Near Kingsville, Tex., is the example of some Union Producing Co. wells at Agua Dulce field. The first two wells at about 6,000 ft. depth were virtually shut in because of the difficulties in keeping them on production against a line pressure of 450 psi. Free pistons were installed in 1954 and in lifting all the liquid accumulations off bottom, raised the gas production to 11 M.M..c.f per month per well.

In this area the majority of the gas wells produce low volumes at first with a few barrels per day of distillate, fresh water, and salt water. They appear to log up and die if bottom-hole pressure gets within 50 psi. of the line pressure. Yet six of such wells on the free piston were able to produce 200 M.c.f. per day

TABLE 1—PRODUCTION THROUGH TUBING

	Gas—M.c.f./day			Liquids—Bbl./day		
	Before	After	Increase	Before	After	Increase
1. Barrett No. 1	907	998	10	8.9	8.9	0.0
2. Barrett No. 2	1,061	1,149	8.3	8.1	9.8	21.0
3. Barrett No. 3	616	735	19.3	6.5	7.0	7.7
4. Barrett No. 4	428	490	14.5	3.5	4.2	20.0
5. S. Juan 32-9 No. 1	577	705	22.2	15.3	16.6	8.5
6. S. J. 32-9 No. 4	869	1,165	34.1	15.7	21.8	38.9
7. S. J. 32-9 No. 5	841	946	12.5	14.1	18.8	33.3
8. S. J. 32-9 No. 16	273	566	107.3	3.3	5.7	72.7
10. S. J. 32-9 No. 23	573	661	15.4	1.4	2.0	42.0
11. Scott No. 4	572	650	13.6	1.4	2.4	71.4
12. Scott No. 5	1,018	1,306	28.3	15.0	16.0	6.7
13. Marcotte No. 1	1,653	2,021	22.3	30.4	39.2	28.9
14. Riddle No. 2-C	1,000	1,145	14.5	30.4	39.2	25.0
15. Riddle No. 1-E	238	722	203.4	...	...	Av. 23.4%
16. Jenkins No. 1	100	467	367.0	...	20.0	...
17. Jenkins No. 2	250	500	100.0	...	15.0	...
18. Bates No. 2	300	467	56.0	...	5.0	...
			Av. 36.2%			
PRODUCTION THROUGH CASING						
19. Atlantic State No. 6	8	72	800.0	2.8	23.0	721.0

"Next step will be adoption of 1½ and 1-in. tubing strings."

and continued to produce on the average for another 2½ years.

In the case of two wells of American Petrofina which fed gas to a 400-psi. delivery compressor at 150-psi. intake and had to be blown down by hand, net production against 150-psi. diminished to an uneconomic level. With free pistons, production was raised to a combined total of 500 M.c.f. per day and profitable production was continued for about 2 years longer.

Removes paraffin . . . Up to this point I have dealt solely with wells in which, for various reasons, the gas and liquids are all brought out through the tubing string. In many of these wells paraffin had been deposited in the tubing string, thus restricting the flow of gas. Extensive work was sometimes necessary to cut paraffin and make way for the free piston. **In all cases,** the free piston eliminated the paraffin problem completely.

Gas, liquid split . . . Turning now to a much more satisfactory dewatering method. Fig. 4 shows an installation where the gas is taken off the casing head and the tubing is relegated to the sole duty of lifting the liquid. The tubing flow line in this case usually goes to a low-pressure separator, unless the liquids present are all valueless when it may lead to a pit. The separator, if desired, can be back-pressured up to a value lower than the casing-head pressure by about 125 per cent of the static head of the slug being lifted.

Optimum flow conditions . . . First, it will be apparent that with a casing annulus area so much larger than that of the tubing, the gas velocity upwards will be so much less that there will be very little fluid lifted by the gas stream. We then have a very long separator in effect. There may be downward trickles of liquid on the surface of tubing and casing, especially towards the bottom, but in all probability the gas at the casing head will be so clean and dry that dehydrators will often be quite unnecessary.

Next, the pressure drop over the gas column in the casing is obviously reduced firstly by the absence of dispersed fluids and secondly by the low friction loss at the lower velocity. Accordingly the total drop will be only a few psi. over the static gas column weight of about 65 psi. at most. The bottom-hole pressure is then continuously maintained very close to its theoretical minimum for the given delivery-line pressure. The formation-to-hole differential and gas production are therefore closely approaching the optimum.

Control . . . The controller motor valve in this case is provided with a small bypass. This takes a small flow of gas from the tubing head continuously over the whole period of time between successive cycles and is adjusted to reduce the tubing-head pressure by an amount equal to the static head of the slug to be lifted. This makes sure that the whole liquid accumulation for that time interval is in the tubing string before the main valve opens, and none in the casing annulus.

Next, by flowing against a much lower back pressure, larger slugs at lower frequencies may be adopted for most wells, but by the same token, larger quantities of liquid can be handled.

The velocity of the free piston and its slug are now of lesser importance and lower values can be adopted. The efficiency of the lift can be maintained at 70 to 80 per cent of the theoretical maximum represented by the production of a slug whose static head equals the pressure difference available to lift it. The type of free piston used will nearly always be one having a closely fitting packoff and capable of operating in extremely low gas velocities.

Casing production . . . Operators in the New Mexico area are now completing their newly drilled gas wells for casing production with free-piston installations run in 2-in. tubing which is solely for dewatering and has no packer. The next step in exploiting the potential benefit of the free piston in gas wells will be the adoption of 1½ and 1-in. tubing strings. This move is already being anticipated.

With a casing-tubing area ratio of the order of 10 to 1 and a free piston with a good packoff and a low traveling velocity, the casing-head gas flow is diminished very little during a liquid lifting cycle and for all practical purposes it will be constant.

Summarizing the advantages of casing gas production over tubing gas production:

1. A lower mean bottom-hole pres can be maintained with no liquid accumulation in the casing but all in the tubing. This permits higher gas-production rates approaching the theoretical maximum possible.

2. Much larger quantities of liquid can be handled.

3. Gas from the casing head will have moved up through a long "separator" at low velocity and is cleaner and drier.

4. Gas flow is not interrupted by liquid cycles and flow-rate fluctuations are virtually negligible.

5. Liquid-lifting efficiency is raised to a very high level minimizing the quantity of gas released to low pressure for lifting liquid.

6. Tubing size no longer has to be larger than 2 in. for large gas wells and at an early date 1½ and 1¼-in. free pistons will be available.

Table 1 shows Atlantic 6 State well, producing from the Mesaverde, where the free piston improved liquid production from 1.1 to 2.5 bbl. per day, an increase of 127 per cent, and improved gas production from 8 M.c.f. to 72 M.c.f. per day, an increase of 800 per cent.

High fluid rates . . . In wells where the total fluid productions are considerably more than those we have been discussing and where flowing conditions can only be maintained by repeated purgings, it is sometimes undesirable to shut the well in at the cycle frequency necessary to lift all the liquid.

In these installations it has been found very satisfactory to split the flow line, installing a time-controlled motor valve on one of the branches. An adjustable choke on the other branch is then set to reduce the flow rate of the well sufficiently to allow the free piston to fall when the motor valve closes its branch.

Costs

Free-piston installation costs may vary from about $900 to $1,600, depending on the size of tubing and type of controls and surface fittings needed.

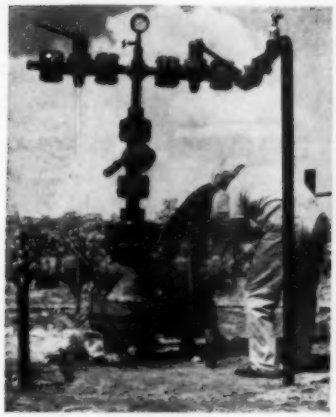
In a considerable number of successful dewatering installations in Longwood, Ivan, Rodessa, and Caspiana fields of North Louisiana and in Carthage field of East Texas, a considerable part of the fluid-production increase obtained is marketable condensate which in many instances had previously been blown away. This revenue has materially contributed towards keeping down the average time for payout.

Payout generally averages about 4 months with variations down to less than 1 month and seldom exceeding 9 months.

On the Job

IN THE FIELDS

How to remove casing valves under pressure



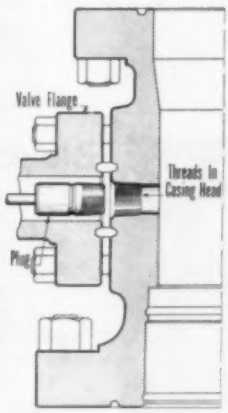
Tommy Basham (right) and Bill Hendrix (back) of Cameron Iron Works, Houston, remove the bull plug and companion flange from the casing wing.

A Cameron valve-removing plug is hex socketed to the end of a polished rod in a valve-removing tool. The tool and plug are then made up with the valve flange.

Photos by Calvin L. Clausel, Jr.
Houston

FOUR YEARS AGO, Highland Oil Co. completed a 2,200-psi. gas well near Rosharon, Tex. The well was shut in until recently. Before putting the well on production, the company decided to check the valve seals on the tree as the valves hadn't been operated during the 4 years.

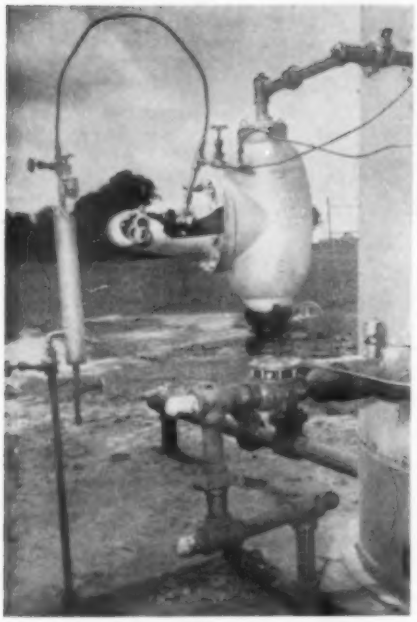
In this series of photos is shown how the valves were pulled under pressure and checked.



The valve is opened and pressure equalized in the system. The polished rod is worked with a Parmalee wrench which shoves the plug through the valve and into the neck of the side outlet in the tubing-head spool, right. At this point, the polished rod is turned to make up the plug with the threads in the casing-head outlet. This seals off well pressure. The polished rod is withdrawn and pressure bled off the entire wing. If there had been reason to believe the threads in the casing head were dirty, they could have been cleaned with a tap.

Pressure relieved, the valve is disassembled, cleaned and inspected, left. After the valve is reassembled, pressure is equalized throughout the system by means of a small hand pump. Note gage reading. Then, the polished rod is run through the valve and reengages the plug. The plug is backed out and withdrawn and the valve closed behind it.

After pressure is relieved downstream from the closed valve, the plugging tool, still holding the plug, is removed and the casing wing reassembled.



Float kidney arranged for modern controls

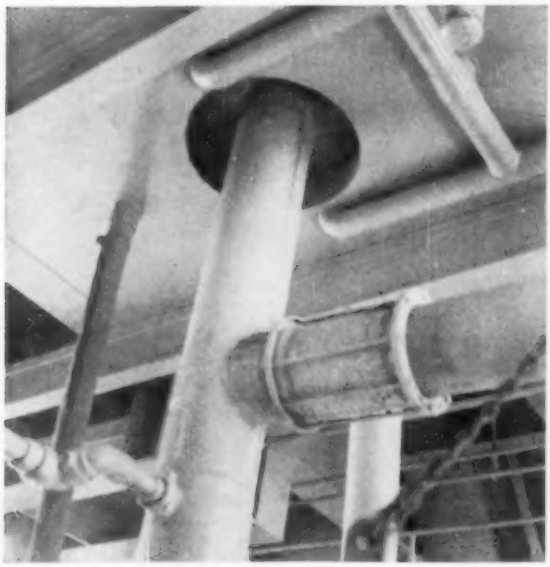
ON THE Texas Gulf Producing Co. Fitgerald lease in Barbers Hill field, Liberty County, Texas, a simple arrangement allows use of the separators with a diaphragm-operated dump valve. The float-operated dump valves on the separators were removed and small diaphragm-operated valves were installed in their places. The levers which operated the dump valves were removed and a small control valve attached to the side of the kidney to which a gas line was connected, through a settling chamber equipped with a filter of metal shavings.

The control valve has a constant bleed-down arrangement which turns the pressure to the diaphragm when the level rises in the separator. This provides more accurate control than in the old dump-valve arrangement and keeps gas out of the tanks and also prevents the separators from loading up and allowing oil to go over into the gas line.

Blocks hold winch truck

CHASTAIN & PEBLEY, contractors of McAllen, Tex., use the blocks shown to prevent the trucks from slipping in soft earth. The blocks are carried behind the dual wheels and when it is necessary to block the wheels to keep the truck from slipping back when the truck is used to skid material, they are dropped behind the wheels. The chains are kept fastened to the bed of the truck and come up tight as the truck is pulled back.

The blocks are made from two pieces of 12-in. pipe cut through the middle and welded back together on the sides as shown. A 4-in. plate was welded across the bottom which cuts into the ground when the wheels roll back on the block and keeps the truck from slipping back.



Seal prevents overflow of conductor pipe

RIG 45 of Penrod Drilling Co., which works off the coast of Louisiana, a neat seal around the conductor pipe prevents the mud from the drill pipe from running back down over the blowout preventers and other controls under the rig floor. The seal is made by clipping a large sheet of neoprene rubber tight around the conductor pipe and laying it flat on the bottom of the rotary-table compartment. Two drain pipes are connected into the bottom of the compartment which keeps the compartment dry and prevents the mud from building up on the sheet of rubber. These pipes lead to a sump and carry away all mud which is spilled around the drill pipe when connections are made. The item was made by the crews of Fred Staggs, tool pusher on the rig.

Midlands and Rockies Continue Expansion

A

• **American Oil Co.** will increase Ultraforming capacity 6,120 bbl. per day and add a hydrodesulfurization unit (Ind.) at El Dorado, Ark., by January 1, 1958. **Lummus Co.** is contractor. Cost will be $3,000,000.

• **American Petrofina, Inc., of Texas,** Division of American Petrofina, Inc., is increasing catalytic reforming capacity 3,000 bbl. per day and alkylation capacity 1,400 bbl. per day at Mount Pleasant, Tex. The alkylation unit will cost $1,000,000 to $1,500,000 and the catalytic reformer will cost $1,000,000 to $1,250,000.

B

• **Ben Franklin Refining Co.** will complete a 1,000-bbl. per day UOP alkylation unit at Ardmore, Okla., late 1957. **Refinery Engineering Co.** is contractor.

• **British American Oil Co., Ltd.,** will complete a 4,000-bbl. per day Atlantic Catformer at Edmonton, Alta., by end of 1957. **Lummus Co.** has contract.

At Clarkson, Ont., crude capacity will be increased 40,000 bbl. per day and capacity of vacuum unit charging topped crude 22,200 bbl. per day by late 1957. **M. W. Kellogg Co.** is contractor.

C

• **Canadian Oil Companies, Ltd.,** may expand the Sarnia, Ont., plant by 20,000 bbl. per day.

• **Carter Oil Co.** is increasing capacity at Billings, Mont., 9,500 bbl. per day by modifying present distillation facilities. Completion is set for spring 1958.

• **Champlin Oil & Refining Co.** will complete a 1,500-bbl.-daily Phillips hydrofluoric acid alkylation unit at Enid, Okla., March 1958. **Badger Manufacturing Co.** is contractor.

• **Cities Service Oil Co., Ltd.,** is building a 20,000-bbl. per day plant at Bronte, Ont., southwest of Toronto. Plant will include a 7,600-bbl.-daily vacuum unit to charge topped crude, a 13,300-bbl.-daily UOP fluid catalytic cracking unit, and a 3,110-bbl.-daily Sinclair-Baker catalytic reformer. **C. F. Braun & Co.** is contractor. Completion is set for December 1958.

Shaded portion of map is area covered in this survey.

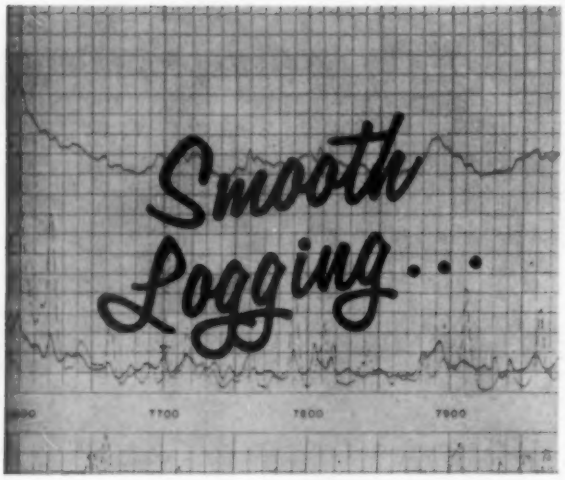
• **Clark Oil & Refining Corp.** will increase crude capacity 7,000 bbl. per day at Blue Island, Ill., by January 1, 1958. By March 1, 1958, a 1,500-bbl. per day hydrofluoric acid alkylation unit will be completed. The UOP alkylation unit is being engineered by **Dushell Engineering, Inc.,** and constructed by **Morrison Construction Co. Procon, Inc.,** has contract for a 12,500-bbl. per day UOP fluid catalytic cracking unit. Expansion program is costing $7,250,000.

• **Continental Oil Co.** will complete a $1,500,000, 3,500-bbl.-daily catalytic reformer at Wichita Falls, Tex., early 1958.

• **Cooperative Refinery Association** will add a 3,500-bbl. per day Platformer and a 3,500-bbl. per day Unifiner at Phillipsburg, Kans., by December 1958, at a cost of $1,250,000. **Southwestern Engineering Co.** will build the UOP units.

At Coffeyville, Kans., **Refinery Engineering Co.** will complete a 1,200-bbl.-daily UOP hydrofluoric acid alkylation unit by early 1958. Cost will run over $1,000,000.

(Continued on page 119)



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Catalyst slide valve gates, throats, and bodies last up to five times longer when hard-faced with Colmonoy No. 1 electrodes. The success of Colmonoy No. 1 in resisting erosion by catalytic fluids has made it the standard material for hard-facing slide valves by many maintenance shops, job shops, and valve manufacturers.

Colmonoy No. 1 electrodes have a new metallic coating that improves arc stability, permits vertical welding, and eliminates weld cleaning between successive passes. This reduces welding time to cut the already low cost of reclaiming valves with Colmonoy hard-facing.

Photo courtesy of Texas Alloy Products Co.

Two 8 inch slides and throats after being reclaimed with Colmonoy No. 1 (shown finish ground)

A valve slide being hard-faced with Colmonoy No. 1 electrodes.

Write for Colmonoy Hard-Facing Manual #79 for more about Colmonoy hard-facing alloys and methods.

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Refinery Construction Report (Continued)

D

● **D-X Sunray Oil Co.** will complete a 6,000-bbl. per day Unifiner at Duncan, Okla., in 1958. **Refinery Engineering Co.** has contract.

At West Tulsa, Okla., **Refinery Engineering Co.** will complete a 12,000-bbl. per day Platformer, a 20,000-bbl. per day Unifiner, a 3,000-bbl. per day hydrofluoric acid alkylation unit, and add 2,000 bbl. per day butane isomerization capacity in 1958.

E

● **El Paso Natural Gas Products Co.** will complete April 1958, a 6,500-bbl. per day plant at Odessa, Tex. It will include crude, vacuum, catalytic cracking, gas concentration, Platforming, and hydrofluoric acid alkylation units.

F

● **Farmers Union Central Exchange, Inc.,** will complete March 1958, a 4,400-bbl. per day naphtha Unifining unit, a 7,100-bbl. per day middle-distillate Unifining unit, and a 5,100-bbl. per day Platformer, all licensed by UOP, at Laurel, Mont. **Refinery Engineering Co.** has contract. Cost is $3,000,000.

H

● **Husky Oil & Refining, Ltd.,** has indefinite plans for crude expansion at Lloydminster, Alta.

Crude expansion and a new 1,000-bbl. per day diesulforming unit are planned for Fort William, Ont. **Poole-Pritchard, Ltd.,** has contract for the $700,000 program.

Crude expansion is planned for Moose Jaw, Sask., but plans are incomplete.

I

● **Imperial Oil, Ltd.,** is expanding plant capacity to 18,500 bbl. per day at Calgary, Alta., as part of a $17,000,000 expansion and modernization program.

K

● **Kerr-McGee Oil Industries, Inc.,** will complete a 5,500-bbl.-daily UOP Platformer and a 4,000-bbl.-daily UOP Unifiner at Wynnewood, Okla., by July 1, 1958. Cost is $4,000,000. **Refinery Engineering Co.** has contract.

L

● **Leonard Refineries, Inc.,** has under way a multimillion-dollar expansion program at Alma, Mich. It includes a 7,500-bbl. per day fluid catalytic cracking unit. **Ralph M. Parsons Co.** has contract for the catalytic cracker.

● **Lion Oil Co.,** Division of Monsanto Chemical Co., plans to add a 5,000-bbl. per day combination hydrogen treating and catalytic reforming unit at El Dorado, Ark., by late 1958.

M

● **McMurrey Refining Co.** will increase Platforming capacity 5,200 bbl. per day and add a 3,200-bbl.-daily Unifiner at Tyler, Tex., by June 1958.

P

● **Phillips Petroleum Co.** will complete spring 1958, a 3,700-bbl.-daily UOP Platformer at Woods Cross, Utah. **Procon, Inc.,** is contractor.

R

● **Royalite Oil Co., Ltd.,** will complete in 1960, a $50,000,000, 20,000-bbl. per day separation plant to process Athabasca oil sands at Mildred Lake, Alta. **Caribou Engineering Co.** has contract.

S

● **Shell Oil Co. of Canada, Ltd.,** plans a 20,000-bbl. per day plant at Bronte, Ont., near Toronto. Construction will probably start in 1958, for completion in 1960.

● **Skelly Oil Co.** will complete a 3,500-bbl. per day Phillips hydrofluoric acid alkylation unit at El Dorado, Kans., spring 1958. Engineering and construction are by Skelly personnel.

● **Socony Mobil Oil Co., Inc.,** will complete December 1957, a 3,500-bbl. per day sulfuric acid alkylation unit at Trenton, Mich. **Fluor Corp., Ltd.,** has contract.

● **Standard Oil Co. (Ind.)** will complete a 6,000-bbl.-daily Ultraformer and a 6,000-bbl.-daily Hydrofiner at Neodesha, Kans., January 1958. **Foster Wheeler Corp.** has contract.

At Whiting, Ind., Ultraforming capacity will be increased 21,000 bbl. per day and Hydrofining capacity 21,000 bbl. per day by April 1958. **Ralph M. Parsons Co.** has contract for the Ultraformer. **Arthur G. McKee Co.** has contract for a 140,000-bbl. per day crude distillation unit, the world's largest. Completion is set for 1959.

At Wood River, Ill., a 67,500-bbl. per day crude-distillation unit and a 30,000-bbl. per day fluid catalytic cracker are being built to replace present units, increasing capacity of the 50,000-bbl. per day plant by 30 per cent. **Arthur G. McKee Co.,** prime contractor, will complete the expansion program in 1959.

At Mandan, N. D., a 1,630-bbl. per day Phillips hydrofluoric acid alkylation unit will be completed September 1958, by **Foster Wheeler Corp.**

● **Standard Oil Co. (Ohio)** will complete a $2,400,000, 3,500-bbl.-daily sulfuric acid alkylation unit at Cleveland, May 1, 1958. **Arthur G. McKee & Co.** has prime contract. Auxiliary facilities will cost $1,000,000.

At Toledo, work is under way to replace present crude, thermal, and polymerization units. Crude capacity will be 60,000 bbl. daily, vacuum unit charging topped crude 23,000 bbl. daily, polymerization 1,650 bbl. daily, and delayed coking 8,000 bbl. daily to produce 350 tons per day of coke. Units being added include a 55,000-bbl.-daily fluid catalytic cracker (45 per cent recycle), a 12,000-bbl.-daily Sinclair-Baker catalytic reformer, and a 22,500-bbl.-daily Kellogg Hydrofiner. **M. W. Kellogg Co.** will complete the $40,000,000 project April 1958.

● **Standard Oil Co. of Texas** will increase crude capacity 28,000 bbl. per day, vacuum unit charging topped crude 13,200 bbl. per day, add a 13,500-bbl.-daily fluid catalytic cracker and a 2,025-bbl.-daily catalytic polymerization unit at El Paso, Tex., by February 1958. **Fluor Corp., Ltd.,** has the catalytic cracker.

U

● **Utah Oil Refining Co.** will increase capacity 6,000 bbl. per day at Salt Lake City, Utah. A $2,125,000 contract has been let to **Fluor Corp., Ltd.,** for a 35,000-bbl. per day pipe still.

W

● **Wainwright Producers & Refiners, Ltd.,** has let contract to **Ralph M. Parsons Co.,** for a 3,000-bbl. per day thermal cracker and a 1,000-bbl. per day Platformer at Wainwright, Alta.

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these Shares. The offer is made only by the Prospectus.

6,549,124 Shares

Standard Oil Company

(Incorporated in New Jersey)

Capital Stock

($7 Par Value)

Rights, evidenced by subscription warrants, to subscribe for these shares are being issued by the Company to the holders of its Capital Stock, which rights will expire at 3:30 P.M. Eastern Standard Time on December 18, 1957.

Subscription Price $44 a Share

The several underwriters may offer shares of Capital Stock at prices not less than the Subscription Price set forth above (less, in the case of sales to dealers, the concession allowed to dealers) and not more than either the last sale or current offering price on the New York Stock Exchange, whichever is greater, plus an amount equal to the applicable New York Stock Exchange commission.

Copies of the Prospectus may be obtained from only such of the undersigned as may legally offer these Shares in compliance with the securities laws of the respective States.

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November 12, 1957.

By Robert L. McIntire
The Datics Corp.

What Is Linear Programing?

LINEAR programing is a mathematical tool in a newly recognized science called operations research. Actually, engineers in petroleum and other industries have been using other operations research techniques for a number of years. All of the tools of the statistician are a standard part of the equipment of the operations research analyst. However, with the addition of linear programing, game theory, and the electronic computer, the formalized method of attack on many important problems confronting engineering and management people is complete.

A later article in this series will explore some of the intricacies of the linear programing algorithms. This article will concentrate first on one of the most useful applications of linear programing—the blending of aviation gasolines for maximum profit.

Statement of the blending problem . . . Five refinery streams are available for meeting the requirements of two aviation-gasoline blends: Grade 100/130 and Grade 115/145. Each of these two blends must meet specifications measured by two performance numbers and the Reid vapor pressure. The input refinery streams are available in limited quantities and the two products are required (according to sales predictions) in given amounts. It is desired to determine the manner in which the desired blends can be made to meet the specifications and still make the maximum possible profit.

Obviously, the blends can be made in a number of different ways. We must "tell" the computer that we do not even care if it decides to "give away" performance if at the same time a greater profit is made. That is, the specifications which must be met are minimum specifications in the cases of performance number, and maximum in the case of Reid vapor pressure.

With a computer available, we do not need to concern ourselves with all of the logic and reasoning which would be necessary if we were to try to solve this problem by cut and try. We depend on the linear programing procedure to arrive at the final solution without the necessity for using touted engineering know-how.

Try a sample problem . . . Table 1 gives the blending specifications and costs of the five available streams. Since stream No. 5 is so cheap, it obviously would be desirable to blend as much of it as possible limited only by the maximum Reid vapor pressure. Such a simplification results in the blending values of Table 2 and the elimination of vapor pressure as one of our restraints. Table 3 lists the required output blends.

These items of information can be expressed as a set of 10 simultaneous equations with 18 unknowns. The extra unknowns are introduced to give a complete balance on all the expressions. For example, X_1 and X_2 are the quantities of blends 1 and 2, respectively, which may not be profitable to make. A similar reasoning will explain the other so-called "slack variables."

Since there are more unknowns than equations, the criterion for selecting the one special set of answers desired is the profit Equation 11. The equation is to be maximized. The final result is given in Table 4. Note that the total desired quantity of the 115/145 blend was not possible without lowering the profit. In addition, 1.7 performance numbers were given away under the conditions of the answer.

Blending by machine is a policy tool. With this answer, we have just begun to solve our total problem. We now must determine if it is necessary in our refinery to give away performance number. We may wish to change the structure of the "profit" equation. That is, we may wish to consider other factors which enter into the makeup of the refinery complex. We may wish to change or reorient process streams in the plant to increase the ratio of the 1C to 3C rating of the blending stocks.

Machines make it feasible to enter into a large-scale study of the multitude of individual factors which influence refinery profit.

TABLE 1—BLENDING SPECIFICATIONS AND COSTS

Stream No.	BL PN 1C+4.6	BL PN 3C+4.6	BL R.v.p.	Cost, cents /gal.
1	122.0	158.3	3.0	17.7
2	109.0	145.0	4.0	16.0
3	97.7	110.0	5.0	14.5
4	90.0	125.0	7.0	13.0
5	114.0	145.0	19.0	11.0

TABLE 2—BLENDING VALUES

Blend No.	PN 1C +4.6	PN 3C +4.6	BL R.v.p.	Cost, cents /gal.	Avail. B/D
A	120	155	7	16	1,000
B	110	145	7	15	1,000
C	100	115	7	14	1,000
D	90	125	7	13	1,000

TABLE 3—REQUIRED OUTPUT BLENDS

Output No.	PN 1C +4.6	PN 3C +4.6	BL R.v.p.	Price, cents /gal.	Desired B/D
1	100	130	7	16	2,000
2	115	145	7	18	2,000

TABLE 4—FINAL RESULT

Use of preliminary blends:

$A_2 = 1{,}000$
$B_1 = 750$
$B_2 = 250$
$C_1 = 500$
$C_2 = 250$
$D_1 = 750$

Preliminary blends not used:

$X_C = 250$
$X_D = 250$

Final blends not made:

$X_2 = 500$

Performance give away:

$X_6 = 1{,}517.2 = 1.7$ PN

Unknowns which were zero:

$X_1 = 0$ $X_3 = 0$
$A_1 = 0$ $X_4 = 0$
$D_2 = 0$ $X_5 = 0$
$X_A = 0$ $X_B = 0$

Material Balance Equations

$$A_1 + B_1 + C_1 + D_1 + X_1 = 2{,}000 \quad (1)$$
$$A_2 + B_2 + C_2 + D_2 + X_2 = 2{,}000 \quad (2)$$
$$A_1 + A_2 + X_A = 1{,}000 \quad (3)$$
$$B_1 + B_2 + X_B = 1{,}000 \quad (4)$$
$$C_1 + C_2 + X_C = 1{,}000 \quad (5)$$
$$D_1 + D_2 + X_D = 1{,}000 \quad (6)$$

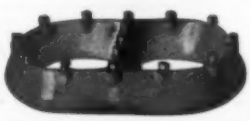
Technology Equations

$$120A_1 + 110B_1 + 100C_1 + 90D_1 - 100X_3 = 0 \quad (7)$$
$$155A_1 + 145B_1 + 115C_1 + 125D_1 - 130X_4 = 0 \quad (8)$$
$$120A_2 + 110B_2 + 100C_2 + 90D_2 - 115X_5 = 0 \quad (9)$$
$$155A_2 + 145B_2 + 115C_2 + 125D_2 - 145X_6 = 0 \quad (10)$$

Profit Equation to Be Maximized

$$Z = 2A_2 + B_1 + 3B_2 + 2C_1 + 4C_2 + 3D_1 + 5D_2 \quad (11)$$

ADVANTAGES OF



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Built in 3-drawer sections with separate tops and bases to permit vertical stacking. Model G-36 files logs scaled to 6,000 feet (up to 65" long).

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Among the Drilling Contractors

Davis and Bates Form New Contracting Firm

Davis & Bates, Inc., is a newly formed contract-drilling firm operating out of San Antonio. Principles are Field Davis, of San Antonio, president; and Joe Bates, of Beeville, Tex., secretary - treasurer. Associated with them as vice president is R. L. Kirkwood.

Davis formerly was manager, and Bates superintendent of Field Drilling Co., also of San Antonio. Kirkwood has been with the former firm of Kirkwood & Morgan, two of whose rigs the new firm now is operating. Bates will headquarter at Beeville, the others at San Antonio.

Davis and Bates have been together in several drilling companies. They first were with Rockhill Drilling Co., which they left to become associated with Field Drilling Co. when this company was organized about 7 years ago by W. Earl Rowe, San Antonio independent operator.

Succeeding them with Field Drilling Co. are Robert Buschman, as general manager, and Tom Neal, as field superintendent. Buschman was assistant sales manager at Houston for National Supply Co., by which company he had been employed for 11 years at San Antonio, Corpus Christi, and Houston. Neal was a tool pusher for Dillard & Waltermire, Inc., Houston contract - drilling firm, with which firm he had been employed since 1939. He will live at Alice, Tex.

Bankhead Drilling Co. is contractor on a deep test Fred W. Bates and Shamrock Oil & Gas Co. are drilling southwest of Opelousas, in St. Landry Parish, South Louisiana. Location, at 1 Brown, in 25-6s-3e, is about 2½ miles northeast of Lawtell field. Permit depth is 11,000 ft.

McClung Drilling Corp., Dallas, is drilling on a rank wildcat contract operation in northwestern Arizona. Ray Terry Oil Co., Inc., of Texas is the operating company. Its location, on Arizona state land, in 34-25n-8w, in Coconino County, is on a 20,000-acre block. Operators plan to take the test to the Tapeats (Cambrian) formation.

McKenzie Drilling Co. is contractor on a 9,500-ft. wildcat test Paul J. Fly, of Victoria, Tex., is starting 5 miles northeast of Berclair, in Goliad County, South Texas. Location is in the Pedro Trevino Survey at 1 Pettus.

Thompson & Nelson Drilling Co., San Antonio, has a rig running on a projected 7,00-ft. test 3 miles north of Leming, in northeastern Atascosa County, Southwest Texas. It is a contract job for Donald Nelson and American Standard Oil Co. The test,

PARTNERS Joe Redding and Porter Bilbo (second and third, respectively, from left) of Bilbo-Redding Drilling Co., Inc., Houston, on one of their frequent visits to the field. Here, they are on location of a well they recently drilled for Group Oil Co. in Magnet-Withers field, Wharton County, Texas Gulf Coast. Shown with them are George Rabery (left end), their pilot, and W. I. Watson, Schlumberger field engineer, and William Rupert, Caterpillar representative, at the right.

1 Ward, in the S. Williams Survey, will be one of the deepest ever drilled in that general area.

George Graham is to drill a 10,000-ft. test for Michel T. Halbouty, of Houston, at a wildcat location northwest of production of Edgerly field, northwest of Edgerly, in Calcasieu Parish, Southwest Louisiana. It will be drilled as 1 Krause & Managan. Spot location is in 19-9s-11w.

Hunt Drilling Co., Corpus Christi, is getting under way on a new wildcat test it has contracted to drill for Union Oil Co. of California about 9 miles northwest of Refugio in northern Refugio County, South Texas. Location is for 1-B Audrey Baumgartner, in the Santiago Serna Survey. Contract is for 8,000 ft.

Maxwell Herring Drilling Corp., Kilgore, Tex., is well under way on a new contract operation 8 miles northeast of Henderson, in northern Rusk County, East Texas. It is a Travis Peak test with depth objective of about 7,600 ft. Operator is Peyton McKnight, Jr., of Tyler, Tex. His location, a wildcat, is on his Todd lease, in the J. M. Bradshaw Survey.

Johnson Drilling Co., Tyler, Tex., has a new contract job in southeastern Kaufman County, East Texas. It is a 5,500-ft. Paluxy test for F. R. Jackson, of Longview, Tex. Location is for 1 Sterker, in the Thomas Henson Survey. It is about 5 miles southwest of Cedarville, and 2 miles east of Walter Fair field, nearest Paluxy production.

Lake Charles Drilling Co., Lake Charles, La., has the contract on a 8,000-ft. test Winston L. Stokes and associates are starting in southwestern Allen Parish, South Louisiana. Their location is at 1 Murray, in 34-6s-6w. It is about a mile south of the two-well South Bunchy Creek field, discovered in 1955.

Henson Drilling Co. and **Sojourner Drilling Corp.,** both of Abilene, Tex., will be the respective contractors on two rank wildcat tests Miami Petroleum Co., also of Abilene, is undertaking in eastern San Miguel County, in northeastern New Mexico. Henson's contract is for 1 Hoover Ranch, in 14-12n-28e, about 13 miles northwest of Tucumcari. Sojourner will drill 1 Bell Ranch, in 34-15n-26e, 32 miles northwest of that city. Both tests are scheduled to be taken to the granite, or 7,000 ft. The operator has tentative plans for two additional tests in that area.

Protects threads—*prevents* galling and seizing—gives *tight* seals—permits *easy* separation—*lengthens* drill string life. These are reasons why 'Bestolife Lead Seal Tool Joint and Casing Compound has been the standard of the oil country for over twenty-five years. Unconditionally guaranteed.

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These Galvomag anodes give us 25% more current than conventional magnesium anodes

Two questions should be asked by anyone who is planning to use galvanic anodes to protect well casings or other underground equipment:

(1) Which anode has the greatest throwing power? Galvomag® magnesium anodes deliver 25% higher current than conventional magnesium anodes—enough punch to assure adequate protection in high-resistivity soils.

(2) Which anode will do the job with the fewest units? Again, the answer is Galvomag. The extra current supplied by these high-potential anodes means four will do the job of five ordinary anodes in normal soils. Net result: lower installation and replacement costs.

Any of the Dow magnesium anode distributors listed below can give you more information. Contact the one nearest you or write directly to us. THE DOW CHEMICAL COMPANY, Midland, Michigan, Department MA-1429HH-2.

Call the distributor nearest you: **Cathodic Protection Service, Houston, Texas • Corrosion Services, Inc., Tulsa, Oklahoma • Electro Rust-Proofing Corp. (Service Division), Belleville, N. J. • Ets-Hokin & Galvan, San Francisco, Calif. • The Harco Corp., Cleveland, Ohio • Royston Laboratories, Inc., Blawnox, Penna. • Stuart Steel Protection Corp., Plainfield, N. J. • The Vanode Co., Pasadena, Calif.**

YOU CAN DEPEND ON DOW

PIPELINE

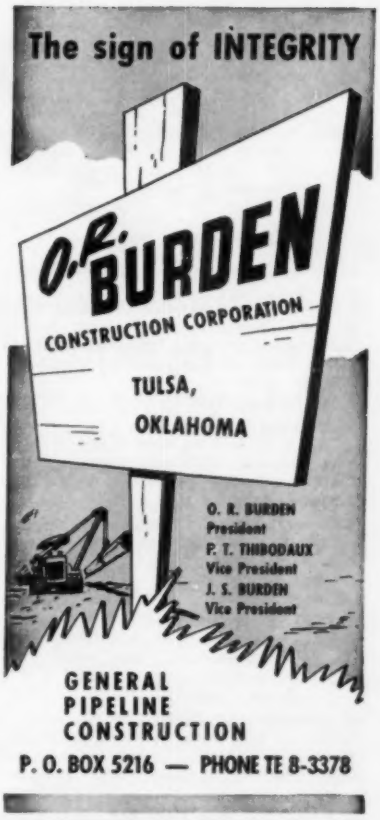
CONSTRUCTION REPORT

Who's Laying Line—and Where

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way.

U.S. Crude-Oil Pipelines

- **Belle Fourche Pipeline Co.**
  Project: 30 miles of 6-in. from Donkey Creek pool to Fiddler Creek pool in northeastern Wyo. Will later build a line from Fiddler Creek to connect with Butte Pipe Line Co. near Osage, Wyo.
  Status: Planned.
- **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.)
  Project: Line from lower De aware Bay to Philadelphia.
  Status: Planned.
  Completion: 1960.
- **Derby Refining Co.**
  Project: 200 miles of 12-in. from Meade County, Kans., to Wichita.
  Status: Under study.
- **Forest Pipeline Corp.**
  Project: 35 miles of 8-in. from Grieve field, Wyoming, to Platte Pipe Line at Casper.
  Status: Under way.
  Completion: Early December 1957.
- **Four Corners Pipe Line Co.** (Shell, Standard of Calif., Continental, Gulf, Richfield, Superior)
  Project: 635 miles of 16-in. from Aneth field in southern Utah to Los Angeles, 86 miles of 12-in. from New Mexico's Bisti field to Red Mesa station 35 miles southeast of Bluff, Utah, and 28 miles of 4, 6, 8-in. feeder lines from other fields in New Mexico and Utah. Will be operated by Shell Pipe Line.
  Status: Under way.
  Contractor: **A. P. Vaughn Construction Co.** and **Potashnick Construction Co.** have 170 miles of 16-in. from Aneth field to Cameron, Ariz.. and 100 miles of 16-in. from Seligman to the Colorado River. **R. H. Fulton & Co** has completed 98 miles of 16-in from Cameron to Seligman, Ariz., and has 217 miles of 16-in from the Colorado River to O ive, Calif., plus river crossing. **Pacific Pipeline Co.** has 46 miles of 16-in. from Olive to Los Angeles. **Standard Pipeline Construction Co.** has feeder lines.
  Completion: February 1, 1958.
- **Gillette Pipeline, Inc.** and **A. W. Hartwig, Inc.**
  Project: A 102-mile line from Dead Horse Creek field to Casper. Wyo.
  Status: Has applied for permit from Wyoming Pub ic Service Commission.
- **Great Northern Railway Co.**
  Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Montana and North Dakota, to Clearbrook or St. Paul, Minn.
  Status: Planned.
  Contractor: **Pipe Line Technologists, Inc.** has completed feasibility study.
- **Humble Oil & Refining Co.**
  Project: 90 miles of 16-in. from Hawley to Comyn, Tex.
  Status: Survey and right-of-way work under way.
  Completion: Late 1958.
- **Magnolia Pipe Line Co.**
  Project: 120 miles of 16-in. from Clyde to Iatan, Tex.
  Status: Under way.
  Contractor: **O. R. Burden Construction Corp.**
  Completion: December 31, 1957.
- **Muskegon Pipe Line Corp.** (Aurora Gasoline Co., Service Pipe Line Co.)
  Project: 165 mi es of 10-in. from Griffith, Ind., to Muskegon, Mich.
  Status: Under way.
  Contractor: **Midwestern Constructors, Inc.** has two spreads working: North end W. T. Wilhite, supt., office at Coloma, Mich.; South end, R. C. Stanley, supt., office at Chesterton, Ind.
  Completion: Demember 1957.
- **Offshore Gathering Corp.,** Houston
  Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana. (Dual line.)
  Status: Proposed.
- **Oil Field Pipe Line, Inc.**
  Project: 20 miles 8 and 12-in. line from near Elkhart, to E linwood, Kans.
  Status: Proposed.
- **Salt Lake Pipe Line Co.**
  Project: 93 miles of 10-in. loops from Rangely, Colo., to Salt Lake City.
  Status: Under way.
  Contractor: **Engineers Limited Pipeline Co.**
  Completion: December 1, 1957.
- **Shell Oil Co.**
  Project: 17 miles of 3, 4-in. in La. Delta area.
  Status: Under way.
  Contractor: **Brown & Root, Inc.,** W. P. Stan ey, supt., office at Buras.
  Completion: March 31, 1958.
- **Shell Pipe Line Corp.**
  Project: 11 miles of 8-in., 3 miles of 10-in., 10 mi es of 12-in., 37 miles of 16-in., and 60 miles of 20-in. from Mississippi River Delta area to New Orleans refining area.
  Status: Planned.
  Contractor: **Coates Field Service, Inc.,** has right-of-way acquisition and claims settlement.
  Completion: September 1958.
- **Sinclair Pipeline Co.**
  Project: 150 miles of 20-in. from Teague, Tex., to Houston.
  Status: To start December 1957.
  Completion: Early 1958.
- **Skelly Oil Co.**
  Project: 50 miles of 12-in. to replace partially looped 6, 8-in. ine between Cunningham and Burton, Kans.
  Status: Under way.
  Contractor: **Groninger & King.**
  Completion: December 1957.
- **Southern Kansas Pipeline, Inc.**
  Project: 200 miles of 6 to 10-in. in Kans. from southwestern Meade County to 10 miles north of Arkansas City.
  Status: Proposed. Request filed with Kansas Corporation Commission for permit.
- **Texas-New Mexico Pipe Line Co.** (Sinclair, Texas Co., Tidewater, Empire)
  Project: 512 miles of 16-in. from southeast corner of Utah to Jal, N. M.
  Status: Under way.
  Contractor: **Four Way Co., Inc.,** has 150 miles from Aneth field southeast. **Panama, Inc.,** has remaining 362 miles.



PIPELINE CONSTRUCTION

Comp'etion: May 1958.

• **Toronto Pipeline Co.**

Project: System to connect fields in Cheyenne, Morrill, and Banner counties, Nebr., to Platte Pipe Line Co.'s 20-in. line from Wyoming to Wood River, Ill., and 13 miles of 4-in. plus field lines to Platt's Redding station.

Status: Planned.

U.S. Products Pipelines

• **Alaska-Yukon Refiners & Distributors, Ltd.**

Project: Two lines: one 150 miles from Haines to Haines Junction, Alaska, linking with government Canol line; another from Tok Junction, on Canol line, to Anchorage.

Status: Proposed.

Completion: 1959.

• **American Pipe Line Co.**

Project: Line from Gulf Coast to New York City. Has ODM approval to amortize 40 per cent of cost with fast writeoff.

Status: Proposed.

• **Buckeye Pipe Line Co.**

Project: 70 miles of 8-in. from Wayne to vicinity of Durand, Mich.

Status: Under way.

Completion: Early 1958.

• **Clark Oil & Refining Co.**

Project: 15 miles of 8-in. from Blue Island, Ill., to Hammond, Ind., area.

Status: Planned.

Completion: Mid-1958.

• **Columbia Gas System, Inc.**

Project: Line from proposed plant near Kenova, W. Va., to proposed plant and storage facilities at Siloam, Ky.

Status: Planned.

• **Conn-Mass Pipe Line, Inc.**

Project: 62 miles of 8-in. and 7 mi'es of 6-in. from New Haven, Conn., to Springfield, Mass.

Status: Planned to begin in 1957.

Completion: April 1958.

Project: 88 miles of 8-in. from Boston to Springfield, Mass.

Status: Proposed.

Project: 133 miles of 16-in. from Linden, N. J., to Hartford, Conn.

Status: Proposed.

Project: 38 miles of 6-in. from Waltham to Fitchburg, Mass.

Status: Proposed.

• **El Paso Natural Gas Co.**

Project: 240 miles of 6-in. from Odessa to El, Paso, Tex.

Status: Under way.

Contractor: **McVean & Barlow, Inc.,** E. J. Miller, supt.

Completion: March 1, 1958.

• **Emerald Pipe Line Corp.**

Project: 120 miles of 6-in. from Sunray, Tex., to Tucumcari, N. M.

Status: Under way.

Comp'etion: December 1, 1957.

• **Everglades Pipe Line Co.**

Project: 60 miles of 10-in. from Port Everglades, Fla., to Miami's International Airport and terminals south.

Status: Under way.

• **Florida Pipeline & Storage Co.**

Project: 67 miles from Everglades, Fla., to Homestead Air Force Base south of Miami.

Status: Under way.

Contractor: **Fish Service Corp.**

Completion: December 1957.

• **Georgia Pipeline Co.**

Project: 7-mile line from Savannah, Ga., to Hunter Air Force Base

Status: P'anned.

Completion: December 31, 1957.

• **Great Lakes Pipe Line Co.**

Project: 165 miles of 8-in. from Minneapolis to Du uth-Superior area, Minn.

Status: Under way.

Contractor: **Laco Pipeline Contractors, Inc.**

Completion: December 1957.

• **Katy and New York Central Railroads**

Project: 2,000 miles of 10 or 12-in. from Houston through Kansas City, St. Louis, Indianapolis and Cleveland to Syracuse then down to New York City. A branch would go through Chicago to Detroit.

Status: Planned.

Contractor: **Williams Brothers Co.** has feasibility study. Report due December 1957.

• **Laurel Pipe Line Co.** (Gulf Refining Co., Sinclair Pipe Line Co., The Texas Co.)

Project: 100 miles of 24-in. and 340 miles of line graduating down to 14-in. at the west terminus, from Philadelphia to Cleveland.

Status: To start early 1958.

Completion: Summer 1958.

• **Leonard Refineries, Inc.**

Project: 43 miles of 6-in. from Alma to Lansing, Mich.

Status: P anned.

Completion: Spring 1958.

Contractor: **Welded Construction Co.**

• **Ohio Oil Co**

Project: 350 miles of 12-in. from Wood River and Robinson, Ill., to Chicago.

Status: Under way.

Contractor: **Panama-Williams Corp.** has 84 miles from Robinson to Champaign.

Completion: 1958.

• **Salt Lake Pipe Line Co.**

Project: 80 miles of 8-in. loops from Adams to Ontario, Ore.

Status: Under way.

Contractor: **Hallmac Construction Co.**

• **Shamrock Oil & Gas Corp.**

Project: Conversion of 120 miles of 6-in. crude line from Sunray, Tex., to Turpin, Okla.

Status: Under way.

• **Underground Storage & Exploration, Inc.**

Project: 393 miles of 12-in. L.P.G. line from Moundsville, W. Va., to Newark, N. J., plus 95 miles of 6, 8-in. laterals to Mauch Chunk, Pa., and to Philadelphia.

Status: Proposed.

• **Union Oil Co. of California**

Project: 815-mile line from Rifle, Colo., to Los Ange es refining area, to carry products from its Rifle shale-oil plant.

Status: Proposed.

U.S. Natural-Gas Pipelines

• **American Louisiana Pipe Line Co.**

Project: 7 miles of 16-in. and 5 miles of 12-in. from Second Bayou to Cameron, La.

Status: Under way.

Contractor: **Ford, Bacon & Davis Construction Corp.**

Completion: December 1958.

• **Arkansas Louisiana Gas Co.**

Project: A 300-mile line, plus gathering lines, from Tex.-La. coastal area to northern La., to connect with present system.

Status: Long-range plans.

• **Carnegie Natural Gas Co.**

Project: Two parallel lines to provide coke-oven gas to six Pittsburgh area p'ants: 9 miles of 55-in. and 4 miles of 43-in. each.

Status: Under way.

Contractor: **Williams Brothers Co.**

Completion: January 1, 1959.

• **Carolina Pipeline Co.**

Project: 177 miles of 2, 3, 4, 6, 8, and 10-in. between Blacksburg and Camden, S. C.

Status: Under way.

Contractor: **Panama-Williams Corp.** and **P. A. Buchanan** have construction contract.

Coates Field Service, Inc. has right-of-way acquisition and claims settlement contract.

• **Central Hudson Gas & Electric Corp.**

Project: 46 miles of 10-in. from Albany to Kingston, N. Y.

Status: Under way.

Contractor: **Williams-Austin Construction Corp.,** O. L. Martin and Ralph Gaddy, supts., office at Catskill, N. Y.

Completion: December 1, 1957.

• **Chicago District Pipeline Co.**

Project: 52 miles of 30, 36-in. between Joliet and Chicago, Ill.

Status: Approved.

Completion: 1958.

• **Cities Service Gas Co.**

Project: 75 mi'es of 30-in. from Independence to near Welda, Kan.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Completion: December 31, 1957.

• **Coastal States Gas Producing Co.**

Project: A 20-mile gathering system from the Rock Island area of Colorado County, Tex., to the United Gas Corp. system.

• **Coastal States Gas Producing Co.** and **Southern Coast Corp.**

Project: 45 miles of 2 to 10-in. in Bee County, Tex. to connect presently shutin fields with Texas Eastern Transmission Corp.'s system.

Status: Planned.

• **Coastal Transmission Corp.**

Project: 562 miles of 12, 20, 22, 24-in. main line and 336 mi'es of 2 to 14-in. gathering lines between McAllen, Tex., and Baton Rouge, La.

Status: Survey and right-of-way work under way. Pipe laying to start January or February 1958.

Completion: January 1, 1959.

• **Colonial Natural Gas Corp.**

Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.

Status: Proposed.

• **Colorado Interstate Gas Co.**

Project: 1957 program: 66 miles of 30-in., 40 miles of 34-in., 109 mi'es of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pueblo, Colo; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 24 miles of 22-in. Panhandle field looping.

Status: Approved.

• **Eastern Shore Natural Gas Co.**

Project: 34 miles of 8-in. and 90 miles of 6-in. from connection with Transcontinenta' Gas Pipe Line Corp. in Maryland, across entire length of Delaware to Salisbury.

Status: Pending FPC approval.

• **El Paso Natural Gas Co.**

Project: 95 miles of 34-in. San Juan main line loops.

Status: Under way. Partially certificated.

Contractor: **R. H. Fulton & Co.** has 28 miles. **Western Pipeline, Inc.,** has 47 miles. Remainder to be 'et.

Completion: April 1, 1958.

Project: 18 miles of 12-in. between Good Field in Borden Co., and the East Vealmoor gasoline plant in Howard Co., Tex.

Status: Has temporary FPC approval.

Project: 177 miles of 20-in. from Sonora plant, Sutton County, to Plains p'ant, Yoakum County, Texas.

Status: Planned. Filed for FPC permit.

Completion: July 1, 1958.

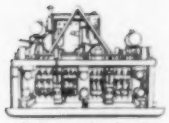
Project: 193 mi'es of 30-in. Permian-San Juan main line loops.

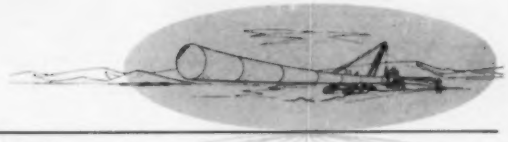
Status: Planned. Filed for FPC permit.

Completion: September 1, 1958.

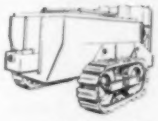
Project: 216 miles of 6 to 34-in. and 533 miles of various size in Ariz., Tex., N. M.

Status: Filed for FPC permit.


stationary cleaning & priming machine



pipeline cradles


pipeline kettles

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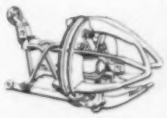
ditch padder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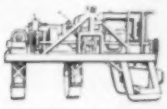
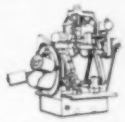
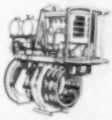
pipe cutting & beveling machine


road boring machine


line traveling coating & wrapping machine

stationary coating & wrapping machine

Cinch hydraulic pipe bending machine


line traveling cleaning & priming machine

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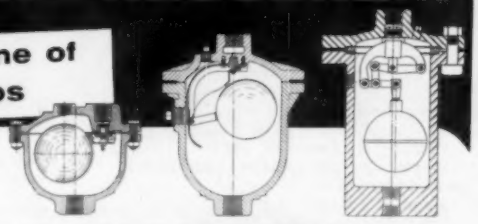

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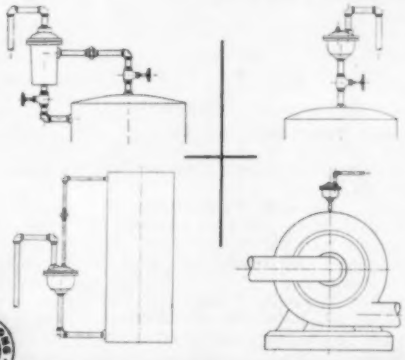

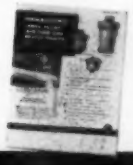

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PIPELINE CONSTRUCTION

Project: 38 miles of various size line to make additional gas available at the McElroy-Wilshire p'ant near Crane, Tex.

Project: 500 miles of 34-in. from Twin Falls, Idaho to California border near Las Vegas, Nev.

Status: Planned.

Completion: September 1, 1959.

• **Equitable Gas Co.**

Project: 12 miles of storage line in Lewis Co., W. Va.

Status: Approved.

• **Gulf Interstate Gas Co.**

Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, Louisiana, and 9 miles of various size field lines in Acadia and Vermilion parishes, Louisiana.

Status: Approved.

Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, Louisiana, and 3 miles of 6-in. loop in Cameron Parish, Louisiana.

Status: Has temporary FPC approval.

• **Houston Texas Gas & Oil Corp.**

Project: 702 miles of 24-in. from Baton Rouge, La., to Kissimmee, Fla.; 139 miles of 18-in. and 101 miles of 20-in. from Kissimmee to Cutler, Fla.; 642 miles of 3 to 18-in. sa'es laterals in Florida. Main line to join Coastal Transmission's line from McAllen, Tex., to Baton Rouge.

Status: Under way.

Contractor: **Midwestern Constructors** has the 702 miles of 24-in.; **Harbert Construction Corp.** has remainder.

Completion: June 1958.

• **Iron Ranges Natural Gas Co.**

Project: 120 miles of 6, 12-in. from Mesabi Iron Range to northern Minn.

Status: Pending FPC approval.

Completion: November 1, 1958.

Project: 63 mi es of 12-in. on north shore of Lake Superior.

Status: Pending FPC approval.

Completion: November 1, 1958.

• **Kerr-McGee Oil Industries, Inc.**

Project: 24 miles of 4-in. in Blocks 21, 22, and 32 to connect wells with its Breton Sound production island off the Louisiana coast.

• **Lone Star Gas Co.**

Project: 25 miles of 12-in. from Wichita Fal's to New York City field in Clay County, Tex.

Status: Planned. Approved.

Contractor: Company personnel.

Completion: December 1957.

Project: 29 miles of 16-in. loops in Freestone County Tex.

Status: Planned.

Contractor: Company personnel.

Completion: December 1957.

• **Manufacturers Light & Heat Co.**

Project: 3 miles of 12-in. from Wel sville to a point in Saline Township, Ohio; 8 miles of 12-in. in Brook County, W. Va.; 4 miles of 10-in. in Ohio County, W. Va.

Status: Has temporary FPC authority.

• **Michigan Consolidated Gas Co.**

Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.

Status: Under way.

Contractor: **Somerville Construction Co.**; Foyd Huduall, supt., office at Cadillac.

Project: 60 mi es of 10 and 12-in. between Muskegon and Ludington, Mich.

Status: Under way.

Contractor: **Somerville Construction Co.**, jointly with **H. L. Gentry Construction.** Frank Morris, superintendent, office at Hart, Mich.

• **Michigan Gas Storage Co.**

Project: 40 miles of 12-in. and 12 miles of gathering lines from Overisal field in Allegan County to Kalamazoo, Mich.

Status: Planned.

Contractor: **Bechtel Corp.**

• **Michigan Wisconsin Pipe Line Co.**

Project: 33 mi es of 4, 6-in., 2 miles of 12-in., 4 miles of 10-in., and 7 miles of 8-in. gathering lines in LaVerne Field, Harper County, Okla.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

Project: 56 miles of 20-in. extension of LaVerne line, Harper County, Okla.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

Project: 25 miles of 12-in. and 21 mi'es of 24-in. loops in Wis. and Mich.

Status: Planned. Pending FPC approval.

Completion: October 1, 1958.

• **Midwestern Gas Transmission Co.**

Project: Line from Portland, Tenn., to Minnesota-Canada border near Emerson, Man.: 670 miles of 24-in., 218 miles of 20-in, 371 miles of 16-in., 115 miles of 12-in., 70 miles of 10-in., 179 miles of 8-in., 147 miles of 6-in., 174 miles of 4-in., 106 miles of 3-in.

Status: Pending FPC approva'.

• **Mountain Fuel Supply Co.**

Project: Extension of 12-in. 'ine from Ogden to Logan and Brigham City, Utah.

Status: Has applied to Utah Public Service Commission.

Completion: Late 1957.

• **Natural Gas Pipeline Co. of America**

Project: 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., plus a gathering system.

Status: Under way.

Contractor: **R. H. Fulton & Co.** has Red River crossing in northern Montague County. **Fulton & Brodie, Inc.,** has gathering system. **Eastern Pipeline Contractors** has completed 86 miles of 20-in. from Bridgeport, Tex., to Hea'dton, Okla. **River Construction Corp.** has 86 miles of 26-in. from Mountain View, Okla., to Wheeler, Tex, Henry Arthur, spread supt., office at Hobart, Tex., and 87 miles of 26-in. from Wheeler to Fritch, Tex., D. C. White, supt., office at Pampa, both to be completed December 1, 1957. **H. B. Zachry Co.** has completed 88 miles of 26-in. between Ringling and Mountain View, Okla.

Completion: January 1, 1958.

Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed 'ine of Colorado Interstate Gas Co., and 91 miles of 30-in. loops along parts of its main line.

Status: Approved by FPC examiner.

Project: 337 miles of 30-in. between Fritch, Tex., and Beatrice, Neb., and 59 miles of 36-in. between Beatrice and Joilet, Ill., along existing system.

Status: Pending FPC approva'.

Completion: 1959.

• **Niagara Mohawk Power Corp.**

Project: 196 miles of 2 to 16-in. transmission and distribution mains to service areas in central, eastern and northern New York.

Status: Under way.

Contractor: Various.

Completion: December 31, 1957.

• **North Carolina Natural Gas Corp.**

Project: 630 miles of 2 to 16-in. from near Mooresville, eastwardly across N. C.

Status: Under way.

Completion: Spring 1958.

• **Northern Natural Gas Co.**

Project: 160 miles of 2, 3, 6, 8-in. branch lines to serve 20 new communities on Aberdeen, S. D. line.

Status: Under way.

Contractor: **Troth Construction Co.**

Project: 73 mi'es of 20-in. from Savanna Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.

Status: Proposed.

Project: 365 miles of main line and 1,090 miles of branch lines to serve communities in Minn., Iowa, S. D., Nebr., Wis.

Status: Filed with FPC March 18, 1957.

Project: 85 miles of 24 and 30-in. loops between Sunray, Tex., and Sioux City, Iowa.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Completion: December 1957.

Project: 13 miles of 16-in. to rep'ace existing 10-in. line in Hansford County, Texas.

Status: Has temporary FPC authority.

Project: 28 miles of 30-in. loop in Tex. and Kans.

Status: Pending FPC approval.

• **Northern Utilities Co.**

Project: 35 miles of 16-in. in Fremont-Natrona County, Wyoming, area; 8 miles of 12-in. around Casper; 6 miles of 8-in. from Sand Draw gas field to Beaver Creek field; 12 miles of 6-in. from Beaver Creek field to the system servicing the Riverton-Lander area.

Status: P anned.

• **Offshore Gathering Corp., Houston.**

Project: 364 miles in Gulf of Mexico off Louisiana: 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in. (Dual line.)

Status: Application pending with PFC.

• **Olin Gas Transmission Corp.**

Project: 20 miles of 10-in. and a Mississippi River 3 and 8-in. crossing near White Castle, La.

Status: Under way.

Contractor: **Houston Contracting Co.**, A. J. Slovack and R. E. Thornton, supts., office at White Castle.

• **Pacific Gas & Electric Co.**

Project: 138 mi es of 34-in. looping of the Topock-Milpitas line.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**

Completion: December 1, 1957.

Project: 5 miles of 16-in., 160 miles of 12-in., 8 miles of 6-in. from Corning to Eureka, Calif.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.** and **Alex Robertson Co.**

Completion: January 1, 1958.

• **Pennsylvania Gas Co.**

Project: 23 miles of 10-in. in Erie County, Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa., 30 mi es of branch lines, several small distribution lines.

Status: Has FPC permit.

• **Permian Basin Pipeline Co.**

Project: 27 miles of 10-in. in Crane and Pecos counties, Tex.

Status: Has temporary FPC approval.

• **Phillips Petroleum Co.**

Project: 30 miles of 3 to 8-in. in Moore, Hutchinson, Sherman, Hansford, and Gray counties, Tex., and in Texas County, Okla.

Status: Planned.

Contractor: Various.

Completion: January 1, 1958.

• **Piedmont Gas Co.**

Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Caro ina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Has FPC approval.

• **Southern Natural Gas Co.**

Project: 335 miles of 4 to 26-in. in southern La.

Status: Pending FPC approval.

Completion: December 1, 1958.

Project: 45 miles of 6 to 10-in. in southern La.

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PIPELINE CONSTRUCTION

Status: Pending FPC approval.
Completion: December 1, 1958.
Project: 25 miles of 6 to 20-in. in southern La.
Status: Pending FPC approval.
Completion: December 1, 1958.

- **Tennessee Gas Transmission Co.**
Project: 556 miles of 30-in. from Mississippi Delta area south of New Orleans to Portland, Tenn.

Status: Has temporary FPC approval.
Project: 76 miles of 24-in. from Coudersport, Pa., to Hamburg, N. Y.
Status: Has temporary FPC approval.
Project: 163 miles of 30-in. and 101 miles of 26-in. from Portland, Tenn., to near Lancaster, Ky.; from Winchester, Ky., to Morehead, Ky.; from Catlettsburg, Ky., toward Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from Morehead, Ky., to Catlettsburg, Ky.
Status: Has Temporary FPC approval.

- **Texas Eastern Transmission Corp.**
Project: 17 miles of 8-in. and 3 miles of 6-in. from its 20-in. Baytown-Hankamer line to Alco-Mag field in Harris County, Texas.
Status: Has FPC approval.

Project: 140 miles of 30-in. between Kosciusko, Miss., and Uniontown, Pa., 105 miles of 30-in. between Opelousas, La., and Kosciusko, 22 miles of 14-in. supply line in La.
Status: Pending FPC approval.

- **Texas Illinois Natural Gas Pipeline Co.**
Project: 44 miles of 36-in. and 4 miles of 34-in. from south of Joliet, Ill., to Howard Street, west of Chicago.
Status: Under way.
Contractor: **Midwestern Constructors, Inc.,** John Work, supt., office at Aurora.

- **Transcontinental Gas Pipe Line Corp.**
Project: 172 miles of 36-in., 68 miles of 30-in., 162 miles of 24-in., and 64 miles of smaller size loops from Tex. to N. J.
Status: Work in North Carolina under way.

Contractor: **Western Construction Co.** has 65 miles of 36-in. and 45 miles of 30-in. at scattered spots along system in S. C., N. C., Pa., and Va. Work will start in N. C., office at Winston-Salem.
Completion: December 1957.

Project: 202 miles of 36-in. and 132 miles of 30-in. main line loop; 164 miles of 24-in. to connect storage in Pa.; 202 miles of 10 to 20-in. gathering lines in southeast La.; 48 miles of 10 to 20-in. to tap gas off Tex.
Status: Pending FPC approval. Planned to start February 1, 1958.

Project: 57 miles of 36-in. main line loop.
Status: Pending FPC approval. Planned for 1959.

Project: 57 miles of 30, 36-in. loops in La., Miss., Ala., Ga., S. C., and 247 miles of mostly 24 and 16-in. laterals in Tex., and La.
Status: Under way.

Contractor: **H. B. Zachry Co.** and **Panama-Williams Corp.** have gathering lines.
Completion: January 1958.

Project: 87 miles of 24-in. laterals, plus small gathering lines connecting seven Louisiana fields with the New Orleans area.
Status: Pending FPC approval.

- **Trans-Western Pipe Line Co.** (Warren Petroleum, Monterey Oil Co.; J. R. Butler).

Project: A line from Four Corners area to Calif. border.
Status: Proposed.

- **United Gas Pipe Line Co.**
Project: 18 miles of 12-in. from Lirette-Mobile line in Jackson County, south to Bayou Casottee industrial area east of Pascagoula, Miss.
Status: Approved.
Project: 202 miles of 30-in. loop from southeast Louisiana, to Mobile, Ala.
Status: Pending FPC approval.

Project: 16 miles of 10-in. near Dayton, Tex.
Status: Under way.
Contractor: **Houston Contracting Co.,** L. A. Young, supt., office at Dayton.

Canadian Crude-Oil Pipelines

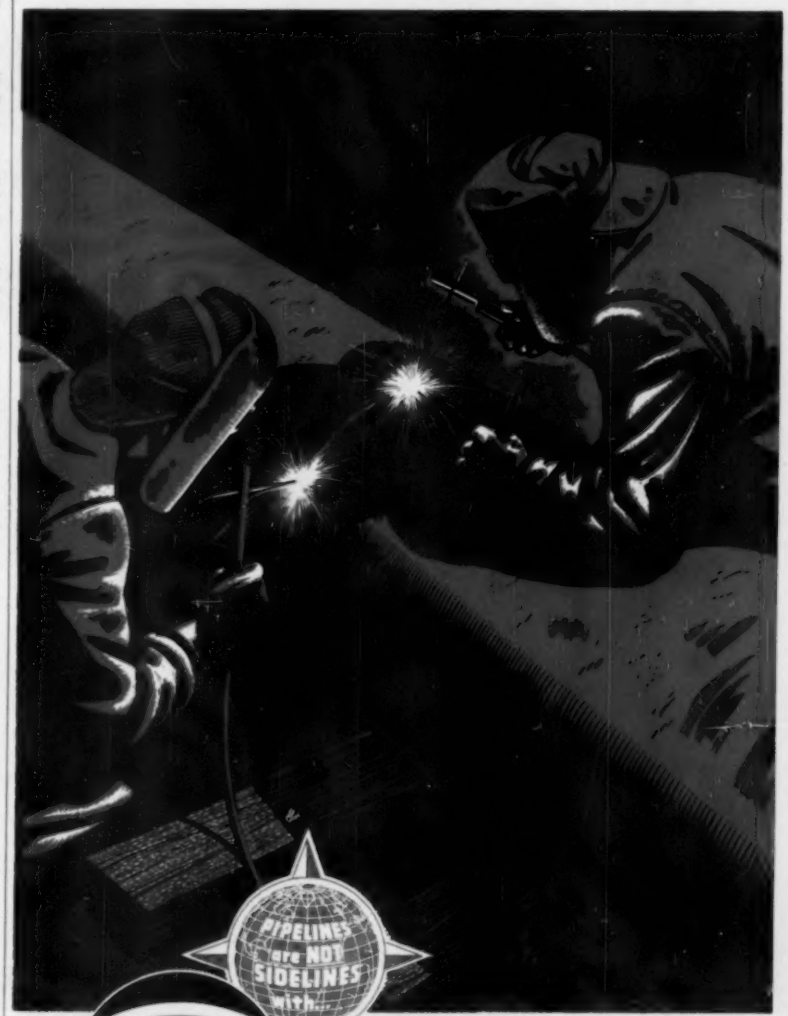
- **Act Oils, Ltd.**
Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Bella Coola, B. C.
Status: Request has been made for permit from the B. C. government.

- **B-A Alberta Pipe Line, Ltd.**
Project: 35 miles of 8-in. to connect Drumheller field, Alberta, with existing lines running to Edmonton.
Status: Pending approval.

- **Gibson Petroleum Co., Ltd.**
Project: 25 miles of line from Willesden Green field to near Rimbley, Alta.
Status: Has Alberta Government approval.

- **Royalite Oil Co., Ltd.**
Project: 250-mile line from Athabasca oil sands, northeastern Alta., to Edmonton.
Status: Long-range plans.
Completion: 1960.

- **Westspur Pipe Line Co.**
Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 34 miles of 4, 6, 8-in. gathering lines.



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PIPELINE CONSTRUCTION

Status: Has requested permit from Board of Transport Commissioners.
Contractor: **Majestic Contractors, Ltd.**, Jeff Minter, supt., office in Estevan, Sask.
Completion: No date set.

Canadian Products Pipelines

- **Hydrocarbons Pipeline Co.**

Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
Status: Has permit from Parliament of Canada. If approved by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board, work will start in 1957.
Construction consultants: **Dutton-Williams Brothers, Ltd.**, and **A. D. Little Co.**

Canadian Natural-Gas Pipelines

- **Alberta Gas Trunk Line Co., Ltd.**

Project: 637 miles of 34 to 16-in. gathering lines in Alberta.
Status: Under way.
Contractor: **Dutton - Williams Brothers, Ltd.**, has preliminary studies, design and management - engineering. **Universal Pipe Line, Ltd.**, subsidiary of Mannix, Ltd., jointly with **Marine Pipeline & Dredging Co.**, has crossing of Red Deer River near Cavendish, Alta., J. Hysuick, spread superintendent, office at Empress. **Fulton Banister, Ltd.**, has completed 17 miles of 34-in. west from Burstall, Sask., to near Cavendish, Alta., and 100 miles of 18-in. north to Bindless and Provost fields.

- **Alberta & Southern Transmission Co., Ltd.**

Project: 1,300 miles of 36-in. from Alberta to San Francisco area plus 47 miles of gathering lines.
Status: Planned.
Completion: 1960.

- **Goliad, Ltd.**

Project: 28 miles of 4, 8-in. in Pembina field.
Status: Under way.
Contractor: **Henuset Brothers, Ltd.**
Completion: November 30, 1957.

- **Northern Ontario Pipe Line Crown Corp.**

Project: 675 miles of 30-in. from the Ontario-Manitoba border to near Kapuskasing, Ont. (part of the 2,250-mile Trans-Canada line; will be leased to Trans-Canada Pipe Line Co. with option to buy.)
Status: Under way.
Contractor: **Dutton-Williams Brothers** has 58 miles from the Manitoba-Ontario border west of Kenora to a point east of the crossing of Ontario Highway 17. **Morrison Shivers, Ltd.**, has 94 miles from the east crossing of Highway 17 to a line separating the townships of Hyndman and Hodgson. **Majestic Contractors, Ltd.**, and **Nelen, Ltd.**, have completed 80 miles from the Morrison Shivers terminal to Stedman Township. **Houston Contracting Co.** has completed 79 miles from Stedman to Fordham Township. **River Construction Corp.** has completed Winnipeg River crossing near Kenora, Ont.
Completion: End of 1957.

- **Ottawa Gas Co.**

Project: 36 miles of 12-in. from Morrisburg to Ottawa, Ont.
Status: Under way.
Contractor: **Majestic Contractors, Ltd.**
Completion: Before end 1957.

- **Trans-Canada Pipe Lines, Ltd.**

Project: 310 miles of 20-in. from Toronto to Montreal, 33 miles of 24-in. from Toronto to Niagara, N. Y.
Status: Under way.
Contractor: **Oklahoma Pipe Line Constructors** (83 miles of 20, 24-in from Toronto to Whitby, Ont., completed); **Grayco Constructors, Inc.** (120 miles of 20-in. between Toronto and Montreal). **Duttton-Williams Bros.** (114 miles between Toronto and Montreal).
Completion: Late 1957.

- **Westcoast Transmission Co., Ltd.**

Project: 42 miles of 20-in. and 100 miles of 30 in. from Savanna Creek area, Alta., to Canadian-Idaho border.
Status: Planned.
Completion: November 1, 1958.
Project: Looping of present system to double capacity.
Status: Planned.

Foreign Crude-Oil Pipelines

- **Assam Oil Co.**

Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.
Status: Survey of possible routes under way.
Contractor: **Pipe Line Engineering Co.** is making survey.

- **Bolivian Gulf Oil Corp.**

Project: 160 miles of 10-in. and 43 miles of 8-in. from Sicascia to Arica on the Chilean coast.
Status: To start late 1957.
Contractor: **Williams Brothers Co.**
Completion: 1958.

- **Bolivia-Paraguay.**

Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned .
Contractor: **Five Lilles,** a French Combine.

- **Burmah Oil Co., Ltd.**

Project: 250 miles of 20-in. from Barauni

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PIPELINE CONSTRUCTION

to Calcutta, India, extending Assam Oil Co.'s proposed line.

Status: Survey under way.

Contractor: **Collins Construction Co.** is surveying locations for some 40 river crossings.

- **Caltex**

Project: 30 miles of 30-in. from Duri field in Sumatra to Dumai where a deepwater terminal will be built. Line wil' be extended 35 miles to Minas field later.

Status: Under way.

Contractor: **Bechtel Corp.**

Completion: May 1958.

- **Colombian Petroleum Co.**

Project: 42 miles of 6-in. from Tibu field to Rio de Oro in Colombia.

Status: Under way.

- **C.R.E.P.S., Societe Nationale de Recherche et d'Exploitation des Petroles en Algerie (SN Repal), and Cie. Francaise des Petroles Algerie**

Project: 105 miles of 6-in. from Hassi Messaoud and Edjele, Algeria, to the railhead at Touggourt.

Status: Planned.

Completion: 1958.

Project: 450 miles of 16-in. from Edjele field in southeastern Algeria to a Mediterranean port on the Libyan coast.

Status: Pipe has been ordered.

- **Creole Petroleum Corp.**

Project: 100 miles of 30-in. from Temblador field to Caripito in Venezuela.

Status: To start work early in 1958.

Contractor: **Pipe Line Engineering Co.** and **Oklahoma Pipe Line Constructors**, R. J. O'Connell, supt., office at Maturin.

Completion: April 30, 1958.

- **Elburz Oil Corp.**

Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.

Status: Planned.

- **Irapian Consortium**

Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.

Status: Planned.

Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal on Persian Gulf.

Status: Planned.

- **Iraq Petroleum Co .**

Project: About 600 miles of up to 40-in. from Kirkuk field through Iraq to Turkish port of Iskenderun on the Mediterranean.

Status: Proposed. Survey completed.

- **Mene Grande Oil Co.**

Project: 97 miles of 30-in. from fields in Eastern Venezuela to Puerto La Cruz.

Status: Under way.

Contractor: **Fulghum Contracting Corp.** has 22 miles between Oficina and Anaco. **Williams Brothers** has remainder.

Completion: First quarter 1958.

Project: 45 miles of 24-in. from Oficina to Melones, Venezuela.

Status: Planned.

Completion: First quarter 1958.

- **Middle East Pipeline**

Project: 1,500 miles of 38 and 40-in. line from Persian Gulf to Mediterranean at Iskenderun, Turkey.

Status: Proposed.

- **North-West Oil Pipeline Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)

Project: 230 miles of 28-in. from refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.

Status: Work to start early 1958.

Contractor: **W. M. Lyles** in joint venture with two German steel firms.

Completion: November 1958.

- **Royal Dutch-Shell**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, and Netherlands, and Belgium. Main trunk to be 30-in.

Status: Company is considering project together with several other companies.

- **Standard-Vacuum Petroleum Maatschappij**

Project: 94 miles of 8-in. from Lirik field, Central Sumatra, to deep-water terminal on Siak River, near Buatan. A 3-in. hot-water "defroster" line will be laid under the 8-in. to heat the heavy crude.

Status: Under way.

Completion: Late 1957.

- **Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie**

Project: Line in Sahara Desert area to move oil from Hassi Massaoud field. Two routes possible: 200 miles from the field northwest of Laghouat; 260 miles from the field to the north and slightly east to Biskra.

Status: Under study.

- **Union of Soviet Socialist Republic**

Project: 2,300-mile Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Balkal.

- **Yacimientos Petroliferos Fiscales** (Argentina)

Project: 932 miles of 12-in. from Campo Duran to San Lorenzo.

Status: Planned.

Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)

Project: 625 miles of 12-in. from Mendoza to San Lorenzo.

Status: To start 1st quarter 1958.

Completion: Mid-1960.

Foreign Products Pipelines

- **Empresa Nacional de Petroles** (Government of Chile) and Cia de Petroles de Chile (Copec), et al.

Project: 75 miles of 10-in. from Chile's coastal refinery at Concon to Santiago.

Status: Under way.

Contractor: **Williams Brothers.**

Completion: Early 1958.

- **Mene Grande Oil Co.**

Project: 60 miles of 6-in. L.P.G. line from Anaco to Puerto La Cruz, Venezuela.

Status: Planned.

Completion: Fourth quarter 1957.

- **North Atlantic Treaty Organization**

Project: 2,000 miles of lines to airfields in parts of Europe.

Status: Under way.

Contractor: **Associated Pipeline Contractors, Inc.** (450 miles from Iskenderun, Turkey, to Batman); **TECHINT** (205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir).

(Continued on page 181)

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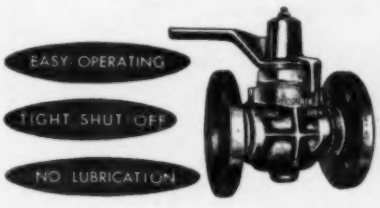

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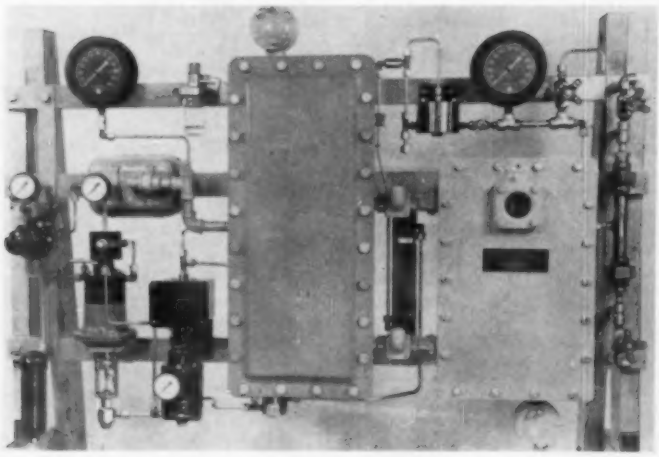

Recorder Charts Vapor Pressure; Models Available for Gas or Gasoline

This unit, developed by the Shell Development Co., comes in two models. Model 1157 is for use on gasolines and other low-pressure hydrocarbons. Model 1158 is a modified version of the Model 1157. It is for use on higher pressures and as an apparatus for indicating proportions of binery mixtures of petroleum gases by a particular vapor pressure. Both instruments accomplish recording by the reading of actual gage pressures. Only the Model 1157 can be correlated with Reid vapor pressures.

Both models are designed for use in Class 1, Group D hazardous areas. They feature an in-line temperature-control system to reduce sample-residence time. And they incorporate test circuits for making adjustments during instrument start-up and for checking day-to-day performance while the apparatus is on stream to verify the condition of the major units in the apparatus.

Vapor pressure is obtained by contacting the liquid phase with its saturated vapor while maintaining the sample at constant temperature, flow, and level. The output of this apparatus is a 3-to-14 psi. pneumatic signal which can be picked up by any pneumatic receiver type of instrument and adapted for indicating, recording, and control. **Write or call: Hallikainen Instruments, 1341 Seven Street, Berkeley, 10, Calif., for details on continuous vapor-pressure recorder.**

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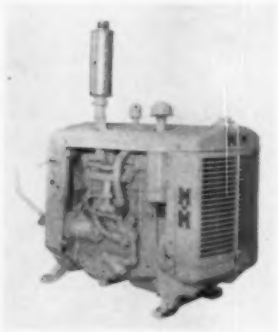

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●

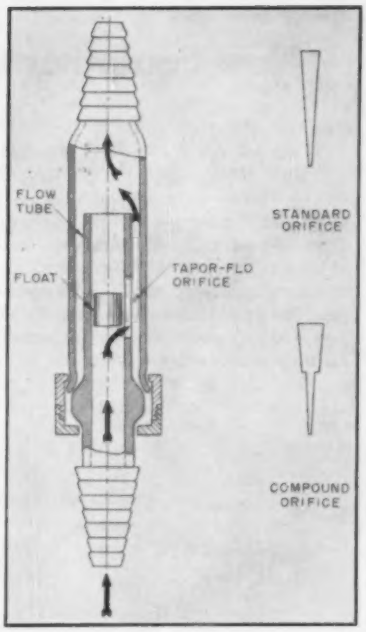
Flow Meter Measures Low Flows

Known as the MB Series Tapor-Flow, this flow meter is an all-glass, variable-area type. It's designed primarily for use in research laboratories, pilot plants, and bench-scale operations. An important feature is its stability.

The float lines out quickly without bobbing to permit exact reading of flow value without visual averaging, the maker reports. Easy installation, maintenance, and range change are other advantages cited.

Maintenance is simple. Only one threaded fitting need be removed to dismantle the instrument for cleaning or meter-range change.

Generally pipe-supported or mounted with a clamp on a laboratory ring stand, the meter is available with either serrated glass connections, standard-taper ground-glass joints, ball joints, or Corning glass flanges for use in glass pipelines. Standard flow-tube sizes are ¼ or ½-in. i.d. Special sizes or connections are available too. Maximum operating pressure is 80 psi. at 70° F. Maximum operating temperature is 150° F. **Write or call: C-Mar Corp., 35 Euclid Avenue, Manasqual, N. J., for details on MB Series flow meter.**



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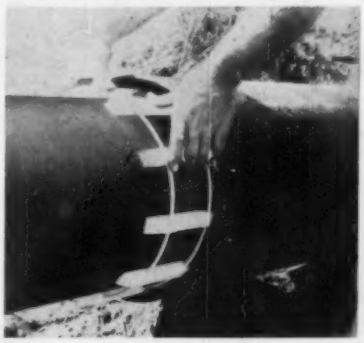

Three-way Cradle Insulates Pipeline

This new WmSON three-way casing cradle is positioned in the casing ends after the drag section is in place and the tie-in welds made.

A flexible nonconductive cradle, it

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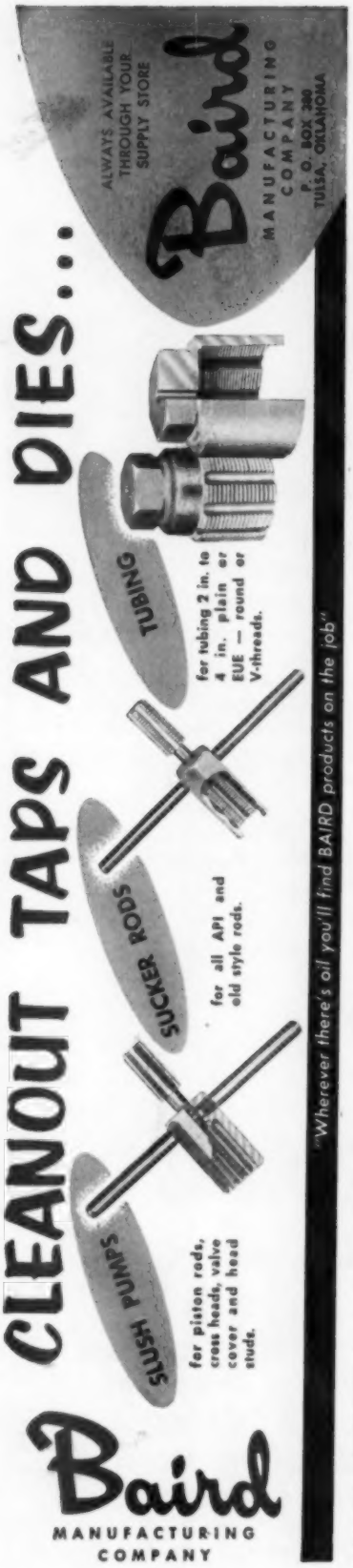
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SHOWCASE . . .

New Equipment

encircles the pipe and prevents the drag section from touching the casing ends should it ride the side or top of casing.

In addition to supporting the pipe at the casing ends, the three-way casing cradle also provides for easy installation of casing bushings. **Write or call: T. D. Williamson, Inc., P. O. Box 4038, Tulsa 9, Okla., for details on three-way casing cradle.**

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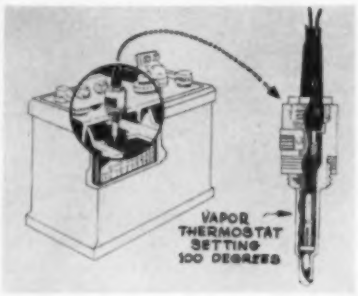

Temperature Control Protects Batteries

The control is used to prevent the electrolytic solution in storage batteries from overheating due to high charging rates. It consists of two parts. One is a mercury-contact thermostat set at 100° F. The other is a bottle type of relay.

The noncorroding thermostat tube is enclosed in a transparent-lucite housing. This housing is threaded through an opening in the top of a centrally located battery in the set. Thus the sensing end of the thermostat dips into the battery solution about 2 in.

When the battery-solution temperature reaches 100° F., the thermostat contacts close the relay circuit. This in turn closes a bridge circuit around a portion of the voltage-regulator resistance unit. The battery continues to be charged at the maximum allowable rate possible while the battery solution is at 100° F., the control point.

The only moving parts in the battery temperature control are the contacts of the relay. These are enclosed in the dustproof bottle-relay housing to assure long, positive contact operation. Various relays are available to work with 32, 64, or 110-volt battery systems. The thermostats are 3⅝ in. long and weigh 6½ oz. The housing is threaded and fitted with a two-conductor lead. **Write or call: Vapor Heating Corp., 80 East Jackson Boulevard, Chicago 4, Ill., for details on battery-temperature control.**

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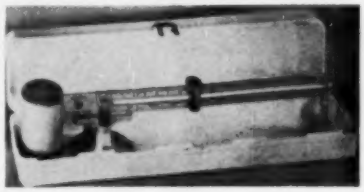

Mud Balance Features Four Scales

The new four-scale and extended-range mud balance has been developed to conform to new A.P.I. Code 29 for specifying the density of drilling mud. This balance has on the front the pounds per gallon and pounds per square inch per 1,000 ft. of depth scales. On the back are the pounds per cubic feet and the specific gravity scales.

The extended range eliminates the need for extra fixtures to cover the densities of mud now in use, the maker reports. The scale ranges are: (1) 6 to 24 lb. per gal., (2) 310 to 1,250 psi. per 1,000 ft. of depth, (3) 45 to 180 lb. per cu. ft., and (4) 0.72 to 2.88 specific gravity.

This balance is made of die-cast aluminum that is polished and anodized for protection against high pH drilling muds. The knife edge and level case are built into an integral unit for easy visibility and for protection of the level glass.

Calibration of the arm is obtained simply by adjusting a screw inside the end of the instrument. The lid for the balance is interchangeable with the two-scale mud balance which has been in use for drilling-mud testing for many years. **Write or call: Bariod Div., National Lead Co., P. O. Box 1675, Houston, Tex., for details on four-scale mud balance.**

●

Skid-Mounted Assembly Meters Crude Oil

A preset set-stop counter automatically shuts the unit down after the monthly oil allowable has been flowed. And an automatic temperature mechanism in the positive-displacement meter automatically corrects the volume of oil measured to 60° F. before registering it on the counter and/or ticket printer.

An adjustable quantity sample of

the fluid passing through the meter is taken in proportion to the flow and stored at line pressure in a sampler. Air and noncondensible gases are automatically separated from the liquid and vented. However, should the quantity of noncondensible gases exceed the air-handling capacity of the deaerator, the unit will automatically shut down and continue venting the gases until the line is again full of liquid. This feature prevents metering of gas through the crude-oil meter.

The components of this system are: (1) line-size strainer, (2) line-size deaerator with gas-bubble coalescing trays and a float-operated air-release mechanism, (3) safety-override float-operated pilot to close a safety shutdown valve, (4) safety shutdown valve, (5) proportional sampler with an adjustable sample pump and a 2-gal. sample-storage capacity (The sampler conforms to the A.P.I. code), (6) positive displacement liquid meter with automatic temperature compensation, set-stop counter and cocking lever, pneumatic transmitter to operate sampler, and large-numeral counter ticket-printer combination, and (7) set-stop valve having an adjustable slow-closing pressure-balanced design. **Write or call: Maintenance Engineering Corp., P. O. Box 2637, Houston, Tex., for details on skid-mounted automatic crude-oil-metering assemblies with proportional samplers.**

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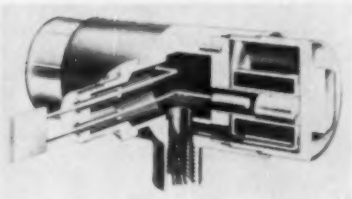

Level Control Rated for 3,000 Psig.

Called the Model CL-10 Dynatol, the level control uses a new design principle for extremely accurate and versatile high or low-point detection or narrow-range proportional control of liquid, solid, and slurry levels, the maker reports. It is a small and rugged control.

A positive-acting electrical-output control signal varies with the amount of immersion of the 120 c.p.s vibrating paddle in the medium being detected. This output signal can be used to control the operation of any type of electrical equipment.

Sensitive transmission of vibrational energy from the driver end of the sensing paddle and back to the output-signal end is achieved through a linkage path welded to rigid metal pressure seals at the node points where zero amplitude of vibration occurs. The unit is explosionproof, corrosion resistant, and rated at 115 volts a.c. Any mounting is possible. Only a ¾-in. N.P.T. pipe opening is required. **Write or call: Automation Products, Inc., 3030 Max Roy Street, Houston 24, Tex., for details on Dynatrol.**

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Roll-down windows, full opening . . . full panel-board head lining and masonite door lining . . . safety glass throughout . . . all-steel welded construction . . . door locks.

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A-11 King Winch on A-120 (4 x 4) International truck.

There's a front-mount King Winch designed to fit your specific needs . . . for ½-ton through 2½-ton trucks . . . pulling capacities of 8,000 to 19,000 lbs.

P.T.O.-driven King Winch on Willys Jeep FOR ALL WILLYS JEEPS, 4 WD TRUCKS AND 4 WD STATION WAGONS.

Power-take-off-driven King Winch models 130J and 131J for CJ-3B and older-model Jeeps, can be transferred to CJ-5 and CJ-6 Jeeps . . nothing extra needed.

King Winches for International trucks available through International dealers.

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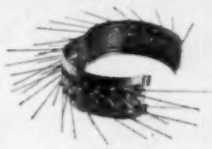
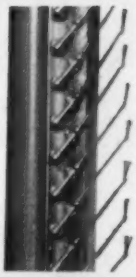


B & W Hinged Nu-Coil Scratcher



B and W Rotating Scratcher — Multi-Flex Type

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. . . equipped with B and W Centralizers and Scratchers (reciprocating or rotating), until the plug "bumps," provides the highest percentage of successful cement jobs.

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You can take it with you!

One of the greatest features of diatomite filtration on a water-flood is that your filtration investment can be completely salvaged at the end of the flood. Modern diatomite filter systems, like the one so cavalierly illustrated above, are being supplied to the oilfields completely unitized for highway travel. Simplifies the problem of test floods. Capital investment in a diatomite system is usually lower, also.

As for filtration effectiveness on the flood, operators agree that no other method can beat diatomite filtration. Using top-quality Dicalite diatomite filteraids, as does the flood pictured above, filtration can be so 'sharp' that even bacteria and other particulates down in the sub-micron range are effectively removed. And Dicalite supplies a complete range of filteraids to give required clarity to any flood water, salt or fresh.

Check with filter manufacturers on the many advantages you gain with diatomite filtration . . . and when you do, ask them about Dicalite. They all approve Dicalite Filteraids.

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SHOWCASE . . .

New Equipment

Paraffin Scraper Improves Production

According to the maker, this new paraffin scraper is particularly recommended not only for paraffin production, but also for improving production in high gas-oil ratio wells or wells that have a tendency to log up; for stopcock work on low-production wells or high-gravity gas-lift wells; and for emulsified fluid production. Neat and sturdy in appearance, the tool is said to be designed for long, trouble-free operation. **Write or call: Macco Oil Tool Co., P. O. Box 7288, Houston 8, Tex., for details on paraffin scraper.**

●

Casing Hanger Is Installed Quickly

The new RWA casing hanger is of the wrap-around type. It also uses the bevel in the casing-head body to pack off pressures. The straight-bore body does not induce collapse of the casing.

The hanger is of two-piece construction. Positive engagement of the tapered casing slips is achieved by providing the slip bowl with a tapered bore. High-tensile-strength bolts attach the packing element to the slip bowl. Casing load is transmitted from the bowl to the pack-off by the bolts.

Removal of a hinge screw and one bolt allows the bowl to open for placement around the casing. **Write or call: Petroleum Industry Equipment Div., Alco Products, Inc., Fourth Floor, Bank of the Southwest Building, Houston, Tex., for details on RWA casing hanger.**

SHOWCASE . . .

New Literature

Vapor Chromatography Analyzer Product Data File COF-1 (four pages) gives information and specifications on the Model 1 Chromat-O-Flex. This analyzer, according to the data sheet, allows wide flexibility in the control of variables. These include flexibility in column construction, flow, sampling, detectors, temperature, and sensitivity. **Write or call: Loe Engineering Co., Box 234, La Canada, Calif., for Product Data File COF-1.**

•

Analysis of 866 Cementing Jobs using Cealment, a Dowell-developed service using latex cement, is given in this new 16-page report. The comprehensive report gives the findings of a survey made to determine the field results achieved with Cealment over a 12-month period—July 1, 1956, to July 1, 1957. Covering seven areas of the United States, the report shows Cealment's over-all success ratio was 75.8 per cent. It covers six types of cementing applications: squeeze, tail-in, liner, plugback, primary cementing, and lost circulation. **Write or call: Dowell, Incorporated, P. O. Box 536, Tulsa, Okla., for "Analysis of 866 Cementing Jobs Using Cealment."**

•

Vertical Hollow-Shaft Motors are reviewed in new four-page Bulletin 2050. These open dripproof motors, NEMA frames 364 through 505, are for shallow and deep-well turbine-pump applications. The bulletin stresses such motor features as a "climatized" enclosure that provides all-weather security, improved thrust-bearing design, metered lubrication, and a protected bearing system. Illustrated are installation and maintenance time-reducing features. **Write or call: Louis Allis Co., 427 East Stewart Street, Milwaukee 1, Wis., for Bulletin 2050.**

•

Computers in the Process Industries, an article originally delivered at a symposium on computers describes problems for computer applications. These include: (1) the formulation and verification of satisfactory mathematical models; (2) development of adequate data-acquisition techniques and equipment; and (3) the accumulation of convincing proof that the advanced computer and control equipment required is sufficiently reliable for process control. Also reviewed are various aspects of data acquisition, the processing necessary on this data, and the system reliability resulting from the use of computer control. **Write or call: Beckman Systems Div., Beckman Instruments, Inc., 325 North Muller Avenue, Anaheim, Calif., for reprint of "Computers in the Process Industries."**

•

Thermocouples of Metal-Sheath Ceramic Insulated Wire that will stand heat up to 2,500° F. and pressures up to 50,000 psi. are described in Brochure 3.8. These thermocouples can be bent or coiled without loss of insulation. Weldment can be performed on the finished thermocouple. **Write of call: Aero Research Instrument Co., 315 North Aberdeen Street, Chicago 7, Ill., for Bulletin 3.8.**

•

Maintenance and Lubrication Information for Rockwell-Nordstrom lubricated plug valves is featured on a new 19 by 24-in. three-color chart. Made of heavy paper and equipped with metal edges, the chart is suitable for display on shop, engineering and maintenance-office walls. It features

detailed exploded views of four types of valves—two-bolt cover, screwed gland, three-bolt and Hypreseal. Also included is a table of recommended lubricants for oil, water, gas and chemical service, as well as complete instructions covering valve servicing. **Write or call: Rockwell Manufacturing Co., 400 N. Lexington Avenue, Pittsburgh 8, Pa., for maintenance and lubrication chart.**

●

Flange Gage of precision-molded plastic and calibrated from ⅛ to ⅜ in. is being distributed. By inserting the gage at intervals around the edge of the flange joint, you can quickly determine if flange faces are lined up evenly while the flange bolts are being tightened. **Write or call: Rector Well Equipment Co., 1100 Commerce Street, Fort Worth, Tex., for flange gage.**

●

Zippertubing is the subject of a new four-page, two-color bulletin. It shows how groups of wires, tubes, pipes, and hoses can be protected from abrasion, corrosion, critical environmental conditions, and excessive wear by the use of the plastic jacket with its zipper type of closure. The zipper pull-tab is detachable and may be "unzipped" and reused where required. Or it may be permanently sealed with a sealer provided by the manufacturer. When sealed, the seam will withstand a linear strength test of 45 psi. Sizes range from ⅜ in. i.d. and larger in increments of ⅛ in. **Write or call: Zippertubing Co., Eighth & South San Pedro Street, Los Angeles, Calif., for Zippertubing Bulletin.**

●

Prestressed Concrete Pile Catalog describes and illustrates the manufacture, versatility and economic applications of prestressed concrete-cylinder piles and related prestressed products. The 20-page brochure gives the merits of prestressed concrete-cylinder piles for foundations of bridges, waterfront, and offshore structures. Numerous photographs of installations and drawings of suggested designs are shown in the brochure. **Write or call: Raymond Concrete Pile Co., 140 Cedar Street, New York 6, N. Y., for catalog.**

●

Electronic Data-Processing System Bulletin, a 36-page guide written in nontechnical layman's language, is now available. Illustrated Booklet U-1275 is designed to clarify the "mysteries" of electronic computers. The booklet describes the units of the system, tells how each works, and presents typical applications and techniques for using the computer. The circuitry of the computer, the meaning of the binary number system, and the language of the electronic computer are also explained. **Write or call: Remington-Rand Univac, 315 Fourth Avenue, New York 10, N. Y., for Bulletin U-1275.**

●

Exhaust Purifiers for Oxidizing Carbon Monoxide, fumes and odors from gasoline, LP-gas and diesel-powered equipment are illustrated and described in a four-page folder, "Exhaust Fumes Are Poison." The literature gives the technical characteristics and typical elimination data for three types of catalytic purifiers: (1) OCM catalytic exhaust purifier for engines fueled with LP gas or unleaded gas, (2) OCM Dieseler for four-cyle diesel engines, and (3) Oxymuffler for engines operating on leaded gasoline. Applications for the exhaust purifiers include fork trucks, stationary engines, over-the-road trucks, and construction equipment. **Write or Call: Oxy-Catalyst, Inc., Wayne, Pa., for exhaust purifiers folder.**

200 GAS WELLS PROTECTED FROM CASING CORROSION

Problem. To protect the casing in more than 200 gas wells from external corrosion. These wells are in the Kansas section of the Hugoton gas field, and are operated by four companies. Six of the wells are in the sand hills area where soil resistivities are of the order of 20,000 ohm-cms.

Solution: CSI engineers made current requirement tests, and then applied cathodic protection using Galvomags—Dow's high-potential magnesium anodes.

Installations were designed to provide a guaranteed current output, with a minimum protection of 10 years. Current requirements ranged from 0.43 to 2.05 amperes. Costs averaged about $325 per well.

For expert consultation, engineering services or cathodic protection materials, call or write today. Estimates or quotations without obligation.

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Magcobar Buys Mineral Dressing Lab, Plant . .

at Bauxite, Ark., from the U. S. Bureau of Mines. Willard M. Johnson, president of Magnet Cove Barium Corp., announced that the plant will be used for research on the commercial uses of selected minerals. Purposes of the research will be the improvement of the metallurgical processes at Magcobar's existing facilities and the development of new products.

J. R. Stein Named to Dow Chemical Co. Post . .

at Plaquemine, La. He is general manager of the Louisiana division facilities now under construction on a 1,700-acre tract 10 miles south of Baton Rouge.

In announcing the appointment. Dr. Leland I. Doan, Dow president, and Dr. A. P. Beutel, Dow vice president in charge of the Texas and Louisiana divisions, said Stein will be responsible for all operations, including construction and development work continuing at the Plaquemine site, as well as production and associated activities as new plants start production next year. Stein has been project manager of the new division since construction of facilities began in 1956.

All Louisiana division plants are expected to be in production by mid-1958. The facilities will produce caustic soda, chlorine, chlorinated solvents and other industrial chemicals.

Stein joined Dow in 1937 and served in organic research and production engineering activities until 1940 when he was assigned to the Texas division to establish the division's production control department. In 1943 he was appointed an assistant general manager. Stein was chairman of the Texas division operating board from its formation in 1947 until he assumed the Louisiana division post in 1956.

T. C. Sutton Elected OPW Corp. Vice President . .

of sales. He will direct OPW's sales activities throughout the United States, Canada and in foreign countries, according to Gilbert B. Richards, president.

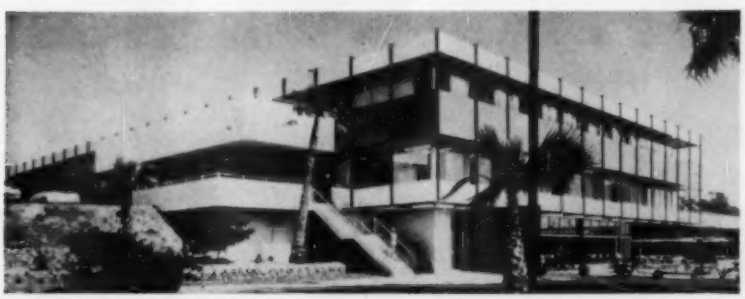
T. C. SUTTON

Sutton established and was the first manager of OPW's industrial engineering department. He was promoted to plant superintendent in 1952, to manager of manufacturing in 1954, and elected vice president of manufacturing in 1955.

Dresser Industries, Inc. Elects John Lawrence . .

as vice president. He formerly was president of Joy Manufacturing Co.

According to H. N. Mallon, chairman of Dresser, Lawrence is experienced in engineering, manufacturing and sales and is familiar with the products and markets of a substantial number of the Dresser companies. He will be located at Dresser's headquarters in Dallas, Tex.



Beckman's Helipot Division Dedicates New Plant . .

in Newport Beach, Calif. The 156,000-sq.-ft. building houses manufacturing and administrative functions for the production of the helical potentiometer, the principal product of this division of Beckman Instruments, Inc. According to D. C. Duncan, division manager. the new Helipot plant is located on a fifteen-acre site. Beckman Helipot also has plants at Mountainside, N. J., and Toronto, Canada.

Electro-Technical Labs Names Tom Gilbert . .

as assistant sales manager. According to D. D. Mize, president of Electro-Tech, a division of Mandrel Industries, Inc., Gilbert will be in charge of all in-plant sales activities in addition to his other duties.

Formerly with General Geophysical Co. in land and offshore operations, Gilbert came to Electro-Tech as a salesman-trainee and worked in various departments throughout the company.

W. W. Robertson Added to Universal Sales Staff . .

as oil field sales representative on drilling and production items. He comes to Universal Packing & Gasket Co. from Tretolite Co. where he was assistant division manager in the Gulf Coast area.

John Feeser Speaks to New Oil Scouts Group . .

at its first meeting in New Orleans. The Louisiana Offshore Oil Scouts Association heard Feeser, sales manager of Brown Tool Co., discuss multiple parallel string completions, assisted by Paul Lawrence, also of Brown. Harold Dean of McEvoy Co. also spoke to the group, using models to show the surface hookup for multiple-string completions.

JOHN FEESER

Louisiana Offshore Oil Scouts was originated by Bailey Summers of Gulf Oil Corp.'s land department.

American Marine Corp. Expands Water Front . .

by acquiring 13 acres of land adjacent to the company's No. 2 yard. According to Walter Michel, assistant vice president, this gives an additional 625 ft. of water front, making available over one-half mile of water frontage.

In order to consolidate activities in one yard where large jobs are under way. AMC has undertaken to install in the No. 2 yard a complete new machine shop, pipe shop, electrical shop, carpentry shop, diesel

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OLD FRIENDS (and new)

More than ever you get the most complete line of mud products from Baroid—more than 50 types and grades. The *new dress* look of our red-yellow and black bags make these products easier to find, to count and to handle.
The products in these *new*, colorful bags are your *sure sign* of top quality, field tested mud materials.

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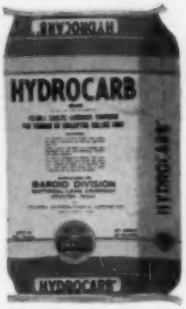
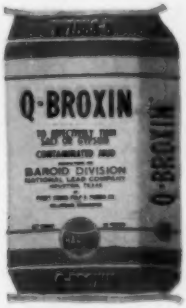


IN NEW DRESS

...and there are even more Baroid products than those you see on these pages!



BAROID

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overhaul shop and store rooms. Yard No. 1 is being used primarily as a barge-fabricating plant.

An outfitting dock is located in the newly acquired area. Along with one 1,200-ton and one 1,700-ton dry dock, the New Orleans firm also added a new 50-ton floating crane.

Edward Valves, Inc. Names West Texas Sales Engineer

Robert E. Lawrence will serve in this post, it has been announced by R. A. Durand, sales manager of Edward Valves, East Chicago, Ind., subsidiary of Rockwell Manufacturing Co.

Since joining the firm, Lawrence has completed the regular training program, which includes training and practical experience in the engineering, laboratory, production, assembly and service departments, as well as field training in the sales, installation and service of Edward valves. Prior to joining Edward, he was an oil-field sales representative for National Supply Co.

Fluid Power Controls, Inc., Names Murrell . .

vice president and general manager. This newly organized Houston firm manufactures hydraulic control valves for blowout preventers and other control equipment.

MURRELL

Conrad Murrell is experienced in design-development work. With Bettis Corp. he was engaged in experimental and field-test programs on oil-tool specialties. For the past 5 years he has been active in development work with Payne Manufacturing Co. where he also served as plant manager.

Fluid Power Controls' new Ramlok valve is designed for service on high drilling pressures and offshore work.

J. T. Blackman, Jr. Named by Williams . .

as sales representative for Louisiana and Mississippi. He will contact industrial and oil-field distributors for J. H. Williams & Co., Buffalo, N. Y. His headquarters are New Orleans.

Blackman, who has sold for both manufacturers and distributors, also will do field work among manufacturers and oil-field operators under direction of southern district manager, Fred B. Roberts.

Kaiser's Napa Plant Ships Its Largest Vessel . .

to a northern California refinery. It is the largest pressure vessel ever built by Kaiser Steel Corp's Napa, Calif., fabricating division plant. The 115-ft. oil refinery fractionating tower is being erected at Tidewater Oil Co.'s Avon refinery near Martinez to form part of a catalytic reformer unit. It will have a processing capacity of 945,000 gallons a day.

The tower will be installed at the refinery by Bechtel Corp., San Francisco, general contractors handling the expansion program.

Joy Manufacturing Elects W. L. Wearly President

The election is a result of the resignation of John Lawrence. A. B. Drastrup was elected executive vice president to fill the position formerly held by Wearly.

Wearly has been with the company 20 years, having started in the operating department of the Franklin, Pa., plant. He later became vice president in charge of sales, and for the past 2 years has been executive vice president.

Drastrup has been manufacturing vice president and assistant to the president. In addition, he has worked in administration of the company's foreign subsidiaries and overseas operations.

Waukesha Motor Co. Buys Climax Plant, Assets . .

giving Waukesha complete coverage in an engine power range up to 1,200 hp. An important product of Climax Engine Manufacturing Co., Clinton, Iowa, is a single-cylinder horizontal engine, produced in three sizes, used largely for oil-well pumping on natural gas fuel. Other principal Climax products are V-type and in-line vertical engines of four, six, eight and twelve-cylinder sizes.

The acquisition of the Climax company adds 160,000 sq. ft. of engine-manfacturing space and an iron foundry to Waukesha's present manufacturing facilities occupying 20 acres of floor area.

The exchange of sales, engineering, and manufacturing methods between the two plants is expected to result in efficient joint operation, greater overall sales and increased service facilities.

Personnel Changes Made By Baroid Division . .

in its Louisiana operations. C. W. Felker, formerly superintendent of the Southwest Louisiana district, has transferred to New Orleans as assistant manager of Louisiana sales.

F. D. Franklin, Jr. has been appointed sales representative of Louisiana sales with headquarters in New Orleans.

Paul A. Newton, formerly sales representative at Lafayette, La., has now assumed duties as manager of the Louisiana sales district. R. T. Sutton, formerly superintendent of the North Louisiana and Arkansas district, has been appointed superintendent of the Southwest Louisiana district at Lake Charles. Replacing him as superintendent of the North Louisiana and Arkansas district is Arlen E. Milligan, formerly sales representative.

J. M. Humble, who previously was sales representative in the Texas Gulf Coast area at Houston, has been appointed superintendent of South Central Louisiana at Lafayette.

E. H. Hearn, formerly service engineer, has been appointed sales representative at Shreveport, and service engineer S. E. Marrs has been appointed sales representative at Lafayette.

CONDOR LS* V-BELTS

COME MATCHED—STAY MATCHED!

***LENGTH STABILIZED . . .** Raybestos-Manhattan announces the most important advance in rig drive V-belt design and engineering. It's the new—*all* new—Condor LS Belts specially developed to outperform any other V-belt on long center, heavy duty drives.

Top to bottom, every part of the new Condor LS Belt has been engineered to eliminate belt whip, wobble, and weave . . . and minimize stretch . . . common causes of undue stress and belt turnover that lead to eventual failure with ordinary long center belts. R/M specialists have developed a new "stabilized" compression section . . . repositioned the belt strength member . . . to provide a degree of lateral *and* longitudinal stability *without stretch* never before possible. This means *positive* belt length control, *smoother* running, *longer* belt life . . . even where belts must take the reverse bends of idler pulleys! It means "More Use per Dollar" for every inch of drive.

ONLY CONDOR LS BELTS ARE VACUUM PACKAGED FOR POSITIVE MATCHING

Each Section C and Section D long length Condor LS Belt is factory measured under controlled humidity . . . length certified and tagged . . . then heat sealed *under vacuum* in aluminum-lined, moisture-proof bags. This keeps your V-belts *factory fresh* to assure maximum protection against oxidation by ozone, or sun, heat or dust during storage. Therefore, each belt reaches your drive length-certified for quick, *positive* matching. Condor LS Belts come matched and *stay* matched on your drive.

Stabilized construction *plus* vacuum packaging add up to a new high standard of rig drive performance. Ask your R/M representative about *new* Condor LS Belt for your drive today . . . or write for Bulletin #M 210.

RM-783

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How to "Rediscover" an Oil Field

By Frank J. Gardner
Exploration Editor

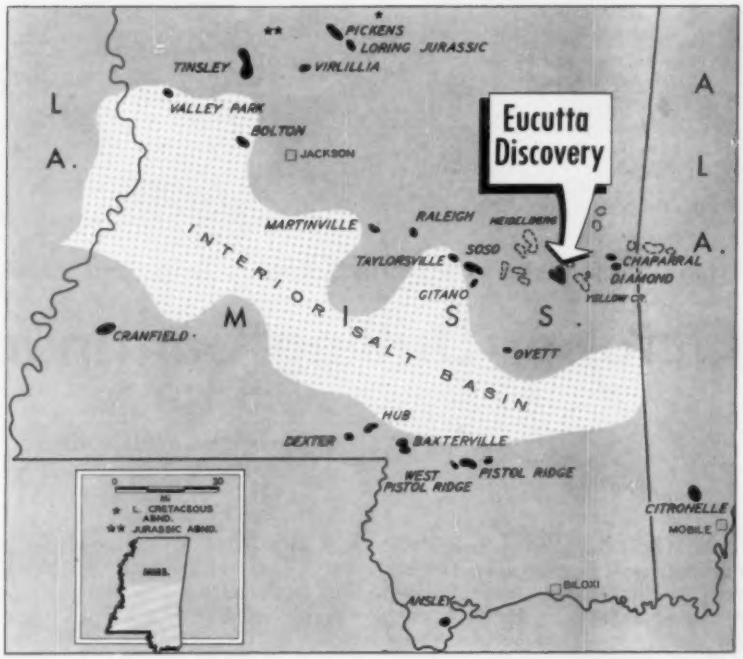
IN THIS WEEK'S exploration pages, you'll find a lot of emphasis on finding oil and gas in old familiar places (pages 156 and 158). It's heartening to know that we can still find new fields in such densely drilled spots as Duval County, Texas. And the finding of such fields underscores the importance of taking a second look at our old oil fields wherever they might be. The prognosticators tell us that in the years ahead, we're going to need ever-greater oil reserves; geologists, at the same time, tell us that oil is getting ever harder to find.

What more logical approach for the independent then, than to search for new oil in the older provinces? The mountain of subsurface data that exists in such places provides the most important tool in the oil finder's kit; combine this with a little 3-D discovery thinking, and you have the cheapest, and probably most successful, oil detector there is.

Obviously, we have overlooked a lot of oil pools in the process of developing those we have; one Gulf Coast authority has gone so far as to say that he believes as much new oil will be found in that region in the next 50 years as has been found in the past 50. He feels that this oil will be found by extensions of older pools, flank exploration on salt domes, new interpretation of the effects of faulting, and . . . deeper drilling.

A prime example . . . Such a pattern of this "rediscovery" of oil is a new strike in Wayne County, Mississippi. In Eucutta field, Gulf Oil Corp. 1 Green (Section 2-9n-9w) has just been completed on ⅛-in. choke for 233 bbl. of 42.5°-gravity oil from the Paluxy-Lower Cretaceous sand at 8,067-69 ft. Eucutta has been producing oil for 14 years from the Eutaw-Upper Cretaceous at 5,200 ft.

The field is a typical graben-type faulted anticline, with two producing areas, a small one on the west and a large one on the east; between them, the "dry" downthrown graben block.



THE LIST OF FIELDS producing from Lower Cretaceous formations in Mississippi continues to grow. Latest addition is 13-year-old Eucutta field in Wayne County.

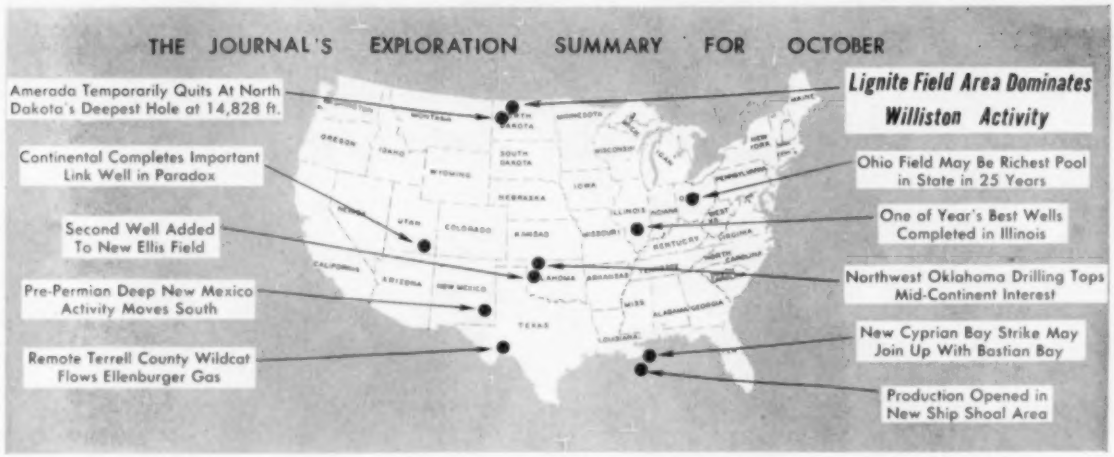
In 1944, Gulf had drilled one deep hole at the north end of the eastern productive segment, the 1 Stanley (Section 36-10n-9w). It went to total depth 11,055 ft., 400 ft. into the Hosston-basal Cretaceous; no shows were found in the Lower Cretaceous section and the well was plugged back for completion in the Eutaw.

Now, many years and many discovery thoughts later, Gulf has stepped out into the middle of the graben block and found a new pool. The discovery was a reentry into one of the company's old dry holes; it had stopped at 5,722 ft. after finding the Eutaw and Tuscaloosa low and dry. In deepening, Gulf carried the new hole to 9,882 ft. in lower Trinity; thus the Hosston, lowermost Cretaceous formation in the section, remains untested. And Eucutta, a veteran oil producer, faces a new era of Lower Cretaceous development.

Will lead to new looks . . . But this new development must surely affect many other of Mississippi's older fields. The event at Eucutta is bound to direct quizzical looks at such fields as Heidelberg, Yellow Creek, and Sharon. All these have had Hosston or Jurassic tests . . . but so had Eucutta. Heidelberg and Yellow Creek are known salt domes, and the structural pictures bear a remarkable similarity to that at Eucutta, a suspected salt dome.

On the map, all Lower Cretaceous fields in Mississippi are shown in black; some of these also have found Jurassic reservoirs; some have now been abandoned. But an obvious alignment along both the northern and southern flanks of the Mississippi salt basin is taking place.

Citronelle has sealed the circle at the southeastern edge of the basin, and it seems reasonable to assume that new fields producing from Lower Cretaceous or Jurassic formations will be found all along the northern flank of the salt basin and on the Wiggins and South Mississippi uplifts along its southern flanks. It's perfectly possible that as much oil as has been found so far in Mississippi still remains to **be** found.


THE JOURNAL'S EXPLORATION SUMMARY FOR OCTOBER
Amerada Temporarily Quits At North Dakota's Deepest Hole at 14,828 ft.
Continental Completes Important Link Well in Paradox
Second Well Added To New Ellis Field
Pre-Permian Deep New Mexico Activity Moves South
Remote Terrell County Wildcat Flows Ellenburger Gas
Lignite Field Area Dominates Williston Activity
Ohio Field May Be Richest Pool in State in 25 Years
One of Year's Best Wells Completed in Illinois
Northwest Oklahoma Drilling Tops Mid-Continent Interest
New Cyprian Bay Strike May Join Up With Bastian Bay
Production Opened in New Ship Shoal Area

From Utah to Ohio, from North Dakota to Texas and offshore

October Drilling Continued Brisk Pace

By John C. McCaslin
District Editor

THE WILLISTON basin held sway over exploratory events in October with North Dakota's new Lignite-Mississippian area in Burke County the center of wildcat success. Other midautumn exploratory activity of importance was reported in northwestern Oklahoma, Ohio, Illinois, South and offshore Louisiana, the Paradox basin, Southeast New Mexico, and far West Texas.

The Williston surge . . . Ever since the discovery of oil at Beaver Lodge in the Williston basin, operators have cast a longing eye at the possibilities of large reservoirs off the Nesson anticline in North Dakota. For nearly 7 years a sporadic exploratory program has waxed and waned in the counties east of the anticline, but each period of drilling met with comparatively little success. Lignite field and surrounding Burke County discoveries of late have changed all this. More than a dozen active operations in this county make it the busiest in Williston.

Nucleus of this Burke County success is new Lignite-Mississippian (Midale) field. Late this summer Northwest Drilling Co. sparked the new drilling spree at 1 Ed Bunting, coming up with a 225-bbl. oil well in the Midale. This discovery was followed by rapid development of the field itself and of the surrounding territory. During October the fifth well was added to the field and a half dozen prospective discoveries were in the offing. The fifth well in the field is Mobil Producing Co.'s 1 Noren, a 210-bbl. well in the Midale.

Shallow production and the very high success ratio of Burke County drilling have made this area of the basin attractive to both majors and independents. All signs point to Burke County as the coming oil province for North Dakota.

Oklahoma stock rises . . . Exploratory success in northwestern Oklahoma continues to make this the most interesting wildcat area in the Mid-Continent.

. . . In Ellis County Shell Oil Co. added the second well to its new field at 1 Hoern, 1 mile south of the discovery well. It flowed 17,000 M.c.f. of gas per day plus 15 bbl. distillate per million from Morrow-Pennsylvanian sand at 8,261-90 and 8,343-61 ft. Another well is on its way to success in the field.

. . . In Woodward County Sinclair Oil & Gas Co. opened the fifth producing area of the county at 1 Gilbert, northeast of the city of Woodward. The Morrow well flowed 6,160 M.c.f. of gas per day and distillate from perforations at 7,521-71 ft.

. . . In Major County a rank wildcat opened Cottage Grove-Pennsylvanian gas production 12 miles from any pool. Pan American Petroleum Corp. 1 Harris flowed 9,400 M.c.f. of gas per day from perforations at 6,207-71 ft. This strike is the easternmost in the developing region of Pennsylvanian production in northwestern Oklahoma.

New Appalachian interest . . . A big concentration of drilling activity in Franklin Township, Wayne County, Ohio, is uncovering what is expected to be the richest pool found in the state in the past 25 years. The Oriskany-lower Devonian sand gaged 7,000 M.c.f. per day in one well on the north side of the field, the Newburg-Silurian is showing gas in several wells, and oil was found in one well in this formation. The main pay sand is the deeper Clinton-Silurian sand with 16 producers and 2 dry holes. About 25 rigs are busy in this area with several more expected to begin operations soon. The field is near the town of Moreland.

Big Illinois well . . . E. H. Kaufman 3 W. J. and J. W. Flannigan, 6 miles south of McLeansboro in Hamilton County, is one of the best wells completed in Illinois this year. It flowed 1,437 bbl. of oil per day from the Aux Vases-Mississippian at 3,117-48 ft. after fracturing.

Important Louisiana news . . . Shell Oil Co.'s new gas discovery in Block 139, Ship Shoal area, 20 miles off

Total October Completions, Exploration and Development

	Total completions							Wildcat wells							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	4	1	0	0	3	0	29,327	3	0	0	0	3	17,883	1	11
Arkansas	110	73	0	2	35	0	357,594	23	2	0	0	21	97,504	0	77
California	230	166	0	2	62	0	956,840	49	3	0	0	46	209,687	0	211
Colorado	92	9	0	16	67	0	486,586	56	1	0	2	53	293,690	0	120
Illinois	328	138	0	1	189	0	805,512	56	0	0	0	56	122,700	42	425
Indiana	88	32	0	0	56	0	154,608	19	1	0	0	18	25,900	21	101
Kansas	420	202	0	23	186	9	1,480,248	81	5	0	3	73	302,696	28	436
Kentucky	172	52	0	18	102	0	221,443	29	3	0	0	26	30,178	41	195
Louisiana	419	217	21	29	152	0	3,045,384	71	11	2	5	53	671,239	0	515
North	187	104	1	15	67	0	688,810	28	7	0	0	21	173,323	0	191
South	157	70	20	0	67	0	1,609,299	31	2	2	0	27	352,047	0	250
Offshore	75	43	0	14	18	0	747,275	12	2	0	5	5	145,869	0	74
Michigan	63	20	0	18	25	0	179,412	20	1	0	0	19	50,752	37	121
Mississippi	36	15	2	0	19	0	283,575	11	0	0	0	11	84,918	0	53
Montana	45	17	0	4	24	0	179,739	19	1	0	1	17	95,671	2	66
Nebraska	98	31	0	0	67	0	574,683	50	5	0	0	45	286,569	0	62
Nevada	1	0	0	0	1	0	688	1	0	0	0	1	688	1	1
New Mexico	224	100	1	78	45	0	1,080,789	28	7	0	0	21	139,203	4	227
Northwest	123	27	0	74	22	0	550,864	13	2	0	0	11	66,832	0	156
Southeast	101	73	1	4	23	0	529,925	15	5	0	0	10	72,371	4	71
New York	36	17	0	1	0	18	38,988	1	0	0	1	0	3,988	35	21
North Dakota	40	22	0	1	17	0	279,856	19	4	0	1	14	109,037	1	55
Ohio	120	67	0	30	15	8	311,726	3	2	0	1	0	11,692	110	153
Oklahoma	555	300	7	22	214	12	1,903,316	74	7	0	3	64	316,390	131	880
Pennsylvania	57	13	0	24	7	13	244,973	0	0	0	0	0	0	50	91
South Dakota	6	0	0	0	6	6	14,897	6	0	0	0	6	14,897	2	2
Tennessee	4	0	0	2	2	0	8,075	3	0	0	1	2	6,725	4	3
Texas	2,037	1,119	46	82	771	19	8,306,738	434	29	8	5	392	1,961,647	70	1,187
Dist. 1	117	51	3	4	59	0	302,455	42	1	1	0	40	116,934	0	56
Dist. 2	80	19	9	15	37	0	458,478	22	0	4	2	16	149,682	0	42
Dist. 3	141	56	10	5	69	1	892,264	34	3	1	0	30	237,007	0	109
Dist. 4	111	35	12	7	57	0	659,804	23	2	1	0	20	154,685	0	56
East	156	90	6	0	60	0	639,486	43	2	0	0	41	233,310	0	59
Dist. 7-B	280	111	1	5	161	2	884,141	98	6	0	1	91	319,434	29	86
West	573	443	3	4	115	8	2,735,823	74	9	0	0	65	379,231	30	540
Dist. 9	455	243	0	9	195	8	1,211,804	87	5	0	2	80	276,336	11	110
Dist. 10	124	71	2	33	18	0	522,483	11	1	1	0	9	95,028	0	129
Utah	40	24	0	1	15	0	213,331	15	0	0	0	15	70,855	0	109
West Virginia	76	11	0	53	12	0	231,569	7	0	0	3	4	38,057	70	261
Wyoming	100	37	1	6	54	2	437,509	33	1	1	1	30	151,060	15	161
Oct. 1957	5,401	2,683	78	413	2,146	81	21,827,406	1,111	83	11	27	990	5,113,626	665	5,544
Sept. 1957	4,431	2,277	76	313	1,662	103	18,278,913	923	93	9	22	799	4,321,875	564	5,572
Cum. 1957	45,398	23,413	494	3,283	17,297	911	187,360,109	9,991	1,002	85	333	8,571	46,781,902	6,548	....
Cum. 1956	48,949	26,015	391	3,469	18,249	825	197,093,000	10,901	1,399	....	379	9,123	52,072,000	....	....

Note: C.T.—Cable tool compl. Act. op.—Active operations. D.D.—31; Calif. 9, Ill. 5, Ind. 1, La. 1, N.W. New Mex. 1, Okla. 6, Texas (2) 2, (3) 1, (7-B) 1, W. Tex. 3, N. Tex. 1.

Western Canada

	Total wells					Cum.	Wildcat wells					Cum.
	Total	Oil	Gas	Dry	Footage	1957	Total	Oil	Gas	Dry	Footage	1957
Alberta	125	63	16	46	667,897	218	44	6	6	32	264,671	339
Saskatchewan	106	71	5	30	448,087	1,039	25	1	1	23	93,874	252
Manitoba	9	4	0	5	22,436	195	4	0	0	4	12,066	59
British Columbia	5	0	4	1	23,967	73	3	0	2	1	12,574	48
Northwest Territories	0	0	0	0	0	3	0	0	0	0	0	3
Western Canada	246	138	25	82	1,162,387	2,528	76	7	9	60	383,185	701

the coast of Terrebonne Parish, opened the state's eighteenth offshore field this year. The number is only six shy of equaling the total number of new offshore fields found last year.

Tidewater Oil Co. has what appears to be an important discovery well in the Cyprian Bay area, 4 miles southwest of Buras in Plaquemines Parish and 3 miles east of the deep, multipay gas-condensite field at Bastian Bay. The 1-A Abercrombie is shut in after flowing nearly 5,000 M.c.f. of gas per day.

The Tidewater discovery may well be an important extension to the Bastian Bay area. Spreading development in the Bastian Bay area fronting on the Gulf of Mexico on Plaquemines Parish's south coast has brought into play the biggest concentration of deep drilling anywhere on the Louisiana coast. There are nearly a dozen active operations within the field's present productive limits. The Tidewater discovery east of the field should further heighten interest in this deep area.

Big Paradox linkup possible . . . Continental Oil Co. may have uncovered an important linkup between Desert Creek and White Mesa fields in San Juan County, southeastern Utah. The Paradox basin discovery, 10 Navajo-A, flowed 3,240 M.c.f. of gas per day on tests of the Pennsylvanian at 5,688-5,744 ft. Location is halfway between the two mentioned fields. Location has been made for the second well in the new field at 2 Navajo-B, a southeast offset.

New Mexico activity moves south . . . Deep wildcat activity in the Permian basin portion of Southeast New Mexico is moving south again. The area is called the "pre-Permian basin deep," and is a region considered high in percentage of favorability for oil accumulation. The deep play involving several important wildcats is actually a shelf development on the north side of the Delaware basin.

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Breakdown of Field Wells Drilled in October 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama							1																				
Arkansas	3	43	16	7	1	1							2							1	5	7		1			
California	29	30	49	21	9	15	8	2						2						3	5	1	2	3		2	
Colorado					7	1					1	1	1	8	3				1		1	4	7	1			
Illinois	10	46	74	8						1									14	46	72	1					
Indiana	3	25	3																8	24	5	1					
Kansas	1	31	115	46	4						1	9	6	4					1	8	72	33	8				
Kentucky	32	16	1							3	9	3	3						48	26	2						
Louisiana	10	61	14	6	25	48	33	26	2	1	5	5		1	5	6	1		1	12	15	6	17	20	17	9	2
North	10	56	13	3	15	1				1	5	5		1	2	1			1	11	15	4	11	4			
South		5	1	3	5	28	21	21	2											1		2	3	11	13	8	2
Offshore					5	19	12	5							3	5	1						3	5	4	1	
Michigan		2	9	6	2						1	17								1	4	1					
Mississippi				1	6	2	7	1												1		2	5				
Montana	1	6	4		3	2				2	1								2	1	3		1				
Nebraska				2	24																1		21				
New Mexico		9	15	37	17	4	12				18	18	10	32					2	4	7	4	1	3	2	1	
Northwest		2	2	6	15						18	14	10	32					1	3	4	1	1	1			
Southeast		7	13	31	2	4	12					4							1	1	3	3		2	2	1	
New York	17																		18								
North Dakota					4	13	1																2	1			
Ohio	13	2	47	3						5	8	12	4						5	7	9	2					
Oklahoma	29	61	107	35	49	17	2				4	2	4	7	2				31	42	39	23	21	6			
Pennsylvania	5	8								1	1	3		19						7	6		7				
Tennessee											1																
Texas	122	198	268	194	239	77	22	8		3	15	30	8	14	4	3			52	135	60	48	68	29	5	1	
Dist. 1	20	9	13	5	4	1				3		1							3	7	6	1	1	1			
Dist. 2	1			6	11	6						7	3	2	1				2		2	8	6	3			
Dist. 3		6	9	10	15	16	6				1	4							1	5	5	4	8	13	4		
Dist. 4		3	5	2	21	12	1				1	1	1	3	1					5	8	2	17	5			
East	34	13	7	6	29	5													3	6	2	4	3	1			
Dist. 7-B	8	32	27	20	19						2		2						12	33	7	10	10				
West	6	41	121	108	109	30	14	8				2				2			4	10	16	11	11	4	1	1	
Dist. 9	53	91	33	34	26	1							1	6					24	65	14	8	12				
Dist. 10		3	53	3	5	6	1				11	15	1	3	2	1			3	4				2			
Utah					24								1														
West Virginia		11									22	10	18						2	2	2	2					
Wyoming	6	3	8	3	11	5							1		4				6	4	5	4	5	2			
Total U. S.	281	552	730	376	419	184	86	37	2	16	87	110	58	87	18	9	1		191	324	313	139	165	66	24	13	2
Western Canada		11	8	81	24	7					9		3	2	2					8	1	8	1	4			
Alberta		6	5	15	24	7					5		2	1	2					7	1	1	1	4			
Saskatchewan		1	3	66							4											7					
Manitoba		4																		1							
British Columbia													1	1													

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Breakdown of Wildcats Drilled in October 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																				1		1			1		
Arkansas			1					1											1	3	8	3	6				
California						1	1	1											5	9	11	9	8	4			
Colorado					1								1					1	2	2	5	20	19	5			
Illinois																			8	22	26						
Indiana		1																	7	10	1						
Kansas			2	3									1	2					2	8	31	23	9				
Kentucky		3																	20	4	2						
Louisiana				3	1	2	2	4	1						2		2	1		2	2	2	10	15	18	2	2
North				3	1	2	1													2	2	2	10	4	1		
South								3	1															10	14	1	2
Offshore							1	1							2		2	1						1	3	1	
Michigan		1																		8	8	3					
Mississippi																						2	5	2		2	
Montana						1						1							1	3	2	4	4	2	1		
Nebraska				1	4																2	12	31				
Nevada																			1								
New Mexico			1	1	2	1	1	1											5	3	1	3	6	3			
Northwest					2															2		2	6	1			
Southeast			1	1		1	1	1											5	1	1	1		2			
New York													1														
North Dakota					1	3				1											6	3	3	1		1	
Ohio			1	1									1														
Oklahoma			1	2	3	1					2		1						7	9	15	7	17	9			
South Dakota																			1	2	2	1					
Tennessee											1								1				1				
Texas		6	2	6	10	7	5	1						4			1		27	107	53	61	86	45	12	1	
Dist. 1		1				1													7	16	8	7	1		1		
Dist. 2					2	2								1			1			2	1	2	5	5	1		
Dist. 3						1	2	1											5	1	1	1	5	15	2		
Dist. 4					2		1												1		1	2	11	1	4		
East					2														1	3	4	4	23	6			
Dist. 7-B		1	1	3	1									1					5	39	14	20	13				
West		3	1	1	1	2	1												3	10	8	14	16	11	2	1	
Dist. 9		1		2	2									2					5	35	16	11	11	2			
Dist. 10						1	1													1			1	5	2		
Utah																				2	3	3	7				
West Virginia														1	2							1	3				
Wyoming			1			1						1							4	6	2	6	9	1	2		
Total U. S.		11	9	17	22	17	9	8	1	1	3	2	6	8	2		3	2	92	201	180	164	224	87	34	6	2
Western Canada		1		2	2	1	1					4	1	2	2					9	11	19	12	8	1		
Alberta		1		1	2	1	1					2		2	2					2	5	7	10	7	1		
Saskatchewan				1								1								5	5	11	1	1			
Manitoba																				2	1	1					
British Columbia												1	1										1				

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft.; F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Footage Breakdown for October 1957

	Fields			Wildcats		
	Oil	Gas	Dry	Oil	Gas	Dry
Alabama	11,444					17,883
Arkansas	196,588	9,585	53,917	15,576		81,928
California	640,375	13,665	93,113	33,809		175,878
Colorado	38,195	82,242	72,459	6,461	21,226	266,003
Illinois	353,680	521	328,611			122,700
Indiana	59,068		69,640	1,285		24,615
Kansas	661,541	77,542	438,469	19,888	15,897	266,911
Kentucky	51,946	38,995	100,324	5,110		25,068
Louisiana	1,508,071	153,761	712,313	131,404	59,858	479,977
North	266,231	60,942	188,314	47,932		125,391
South	849,406		707,846	59,126		292,921
Offshore	392,434	92,819	116,153	24,346	59,858	61,665
Michigan	63,632	48,465	16,563	1,603		49,149
Mississippi	154,643		44,014			84,918
Montana	60,559	4,477	19,032	9,080	3,687	82,904
Nebraska	155,601		132,513	28,056		258,513
Nevada						688
New Mexico	489,662	337,169	114,755	53,832		85,371
Northwest	124,497	323,417	36,118	11,177		55,655
Southeast	365,165	13,752	78,637	42,655		29,716
New York	17,000		18,000		3,988	
North Dakota	149,453		21,366	35,404	184	73,449
Ohio	175,564	70,459	54,011	7,454	4,238	
Oklahoma	974,239	116,065	496,622	38,948	7,824	269,618
Pennsylvania	22,786	148,710	73,483			
South Dakota						14,897
Tennessee		1,350			1,350	5,375
Texas	4,608,804	314,314	1,421,973	333,986	38,971	1,688,690
District 1	124,109	6,229	55,183	9,332		107,602
District 2	144,192	55,088	109,516	28,623	20,566	100,493
District 3	390,914	13,414	250,929	42,792		194,215
District 4	277,101	34,432	193,586	21,417		133,268
East	339,830		66,346	13,643		219,667
District 7-B	355,249	13,147	196,311	23,915	5,400	290,119
West	2,081,251	29,454	245,887	50,369		328,862
District 9	615,749	41,718	278,001	22,573	13,005	240,758
District 10	280,409	120,832	26,214	21,322		73,706
Utah	138,586	3,890				70,855
West Virginia	21,585	150,943	20,984		16,669	21,388
Wyoming	163,714	28,606	94,129	11,157	3,092	136,811
Total U. S.	10,716,730	1,600,759	4,396,291	633,053	176,984	4,303,589
Western Canada	620,817	64,571	93,814	42,028	47,575	293,582
Alberta	298,027	43,058	62,141	38,178	37,179	189,314
Saskatchewan	314,532	10,120	29,561	3,850	2,950	87,074
Manitoba	8,258		2,112			12,066
British Columbia		11,393			7,446	5,128

Deep objectives are the Devonian, Ellenburger - Cambro - Ordovician, and Pennsylvanian.

Remote Val Verde discovery . . . Way down in far West Texas Magnolia Petroleum Co. 1 Bassett, a northeastern Terrell County wildcat which blew out last summer in the Silurian, is now a promising Ellenburger discovery in an area far removed from production. Nearly 200 ft. of Ellenburger pay is in evidence at this well which lies 39 miles northeast of the town of Sanderson. Geologically, the wildcat is in the Val Verde basin or the extreme south part of the Midland-Permian basin. The Val Verde basin is believed to be connected to the Midland-Permian basin via the Sheffield channel. At any rate, more wells are needed in this wild country to determine the promising new petroleum province's future. Magnolia's apparent success is a big step toward tapping one of Texas' most secretive oil-shy regions.

EXPLORATION THIS WEEK

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EXPLORATION HIGHLIGHTS

APPALACHIAN

EASTERN KENTUCKY

Drilling Continues at Card Creek Wildcat

On Card Creek in Pike County, United Fuel Gas Co. is drilling at 2,316 ft. at their wildcat 8503 John S. Cline. The Ravencliff formation was topped at 1,795 ft. from an elevation of 1,112 ft.

WESTERN KENTUCKY

Webster County Wildcat Swabs Jett Oil

Webster County has a new Tar Springs-Jett sand oil discovery at Lohmann-Johnson Drilling Co. et al 1 Ray Russell in 4-M-23, 4 miles northeast of Dixon.

The well swabbed 17½ bbl. of oil natural per hour from Tar Springs at 2,134-56 ft

OHIO

Wayne County Wells Gaged

Blood Rotary Drilling Co. 1 H. Schmit, Section 3, Franklin Township, Wayne County, gaged 70 bbl. after fracture from Clinton at 3,575-3,620 ft. while their 2 Schmit, 70 ft. to the north, gaged 20 bbl. oil and 700,000 cu. ft. gas from the Newburg sand at 3,075-3,195 ft.

Long-Dormant Blacheyville Field Extended Southeast

Blacheyville pool in Plain Township, Wayne County, long inactive, was extended a location to the southeast by the Hendricks O. & G. 1 M. C. Ebright, Section 27. Clinton sand at 3,213-55 ft. made 236 bbl. in a 24-hour test after fracture.

Production Extended

Smith Petroleum Co. extended production over into Marion Township, Hocking County, by their completion on 1 J. A. Gartner, Section 1. Clinton was logged at 2,774-80 ft. with a gage of 2,000,000 cu. ft. after fracture.

Bright Spots Dot Sooner State Map as Recent Wildcat Strikes Spur Activity

RECENT wildcat discoveries in various parts of Oklahoma promise the state a busy development program during the coming months. Nearly every section of the state is represented in this program.

NORTH

Alfalfa County on the northern border of Oklahoma has been one of the most successful wildcat and subsequent development counties in the state for more than a year. The Cherokee sand of Pennsylvanian age has yielded several important oil, gas, and gas-condensate fields, mostly in the northern part of the county along an east-west line.

PANHANDLE

The most active field in this area at the present time is Glenwood-Highland district in Beaver County.

Shell Oil Co. recently completed its 1 Lonker-C in SW NE 2-5n-27eCM, from Morrow-Pennsylvanian sand at 6,199-6,223 ft. for 19,500 M.c.f. of gas per day with 11 bbl. of condensate per million.

First oil production has been added to this area as a result of Sinclair Oil & Gas Co.'s success at 1 Whisenhunt in Highland field, NE SW 3-3n-28eCM. This Morrow well flowed 264 bbl. of oil in 22 hours with 450 M.c.f. of gas per day from perforations at 7,050-7,105 ft.

Cimarron County . . . One of the most significant wildcat discoveries in the Panhandle in some time is The Texas Co.'s 1 Youtsler in SW NW SE 23-1n-9eCM. This southeastern Cimarron County wildcat has found commercial prospects in the Chester at 4,576-82 ft. (2,500 M.c.f. per day), the Morrow at 4,283-97 ft. (4,400 M.c.f. per day), and in several other Pennsylvanian zones.

The Keyes area in Cimarron County remains active with a 40,000-M.c.f. per day well completed open flow by Colorado Interstate at 1 Fidler in NE 7-4n-8eCM. This one flowed from Keyes sand - Pennsylvanian at 4,766-93 ft.

Texas County . . . The deep pre-Permian drilling inside shallow Hugoton gas field that has been under way for several years now continues to meet with considerable success.

Warren-Bradshaw has a wildcat going in 9-2n-10eCM, Cities Service Oil Co. has one in 11-4n-14eCM, and Panhandle Eastern Pipeline Co. has a good Morrow oil well in North Hardesty field, NE NW 24-3n-17eCM. The well flowed 232 bbl. of oil daily from perforations at 6,277-93 ft.

SOUTHWEST

Magnolia Petroleum Co.'s deep Sterba wildcat in Cement field, Caddo County, Oklahoma's deepest hole, didn't find the Ordovician during drilling and is now back up the hole in the Springer at 14,008-14,419 ft. Perforations in four places got 50 bbl. of condensate in 6 hours with mud on one test. Testing continues at this ultradeep hole.

SOUTH

Garvin, Love, and Stephens counties continue active in Oklahoma development and exploratory drilling this year with a good drilling picture ahead in the coming months.

Caulkins Oil Co. is making production tests at a Garvin County well in the Maysville area. The 1 Glover, SE SE 6-4n-2w, flowed 45 bbl. of oil per hour from Bromide sand perforations at 7,345-94 ft.

W. B. Cleary, Inc., has an important extension discovery at East Antioch. The 1 Murray, NW NW SE 19-3n-1w, got 3,000 ft. of clean oil on test of the Bromide at 5,150 ft. Production tests in the third Bromide sand got 50 bbl. of oil per hour and the first Bromide sand got 16 bbl. per hour. This discovery will have a daily flow potential of about 1,000 bbl.

Love County . . . The Texas Co. added a new-pay discovery to Southwest Enville field at 2 Green in NE SW NE 18-7s-3e. The well flowed 342 bbl. of oil per day on small choke from Sycamore perforations at 2,606-97 ft. The field has production from Hunton and Oil Creek.

A wildcat south of Enville field, Pasotex Petroleum Co. 1 Branan, 30-7s-3e, is an indicated Oil Creek sand Ordovician discovery at 13,940 ft. Testing continues at this possible strike. The Oil Creek was found about 5,000 ft. lower structurally than at Enville itself.

Stephens County . . . Goff - Leeper Drilling Co. has a new discovery well

in the Niles sand at 1 McKinney-Abney, SE NW 15-2n-7w, in the East Marlow area. The well flowed 443 bbl. of oil daily from perforations at 7,533-43 ft. It also is a Wade sand gas strike at 8,328-40 ft., flowing 7,553 M.c.f. per day.

Parker Drilling Co. 1 Roberts, another Stephens County discovery in SW SW NW 29-2s-5w, flowed open 20,000 M.c.f. of gas per day from the Arbuckle - Cambro - Ordovician at 2,964-95 ft. This is in the Velma district.

NORTHWEST

Northwestern Oklahoma is one of the most attractive new oil and gas provinces in the Mid-Continent region.

Pan American Petroleum Corp. has a discovery in the west part of Major County near Sherman at 1 Harris, SE NW 13-22n-16w. A drill-stem test in the Cottage Grove sand at 6,207-71 ft. flowed 9,400 M.c.f. of Pennsylvanian gas per day with some distillate.

Woods County . . . Amerada Petroleum Corp. extended Dacoma field at 1 Morse, NW NW 25-25n-12w, with gas production coming from the Layton sand at 5,195-5,274 ft. The well flowed 9,700 M.c.f. of gas per day with some distillate. The strike has Cherokee production at 5,917-69 ft. (1,000 M.c.f. per day).

Woodward County . . . Sinclair Oil & Gas Co. recently gave this county its fifth producing area at 1 Gilbert near Woodward. The well, located in SE NW 1-23n-20w, found lower Morrow production at 7,523-38 ft. and 7,567-71 ft. Gas flow was 3,500 M.c.f. per day with some distillate.

Shell Oil Co. added another well to its new field in SE NW 23-22n-17w at 1 Garvie-B. The gas-condensate strike flowed 13,000 M.c.f. per day with 3 bbl. condensate per million on tests of perforations at 7,137-64 ft. in the Chester - Mississippian lime.

SOUTHEAST

Southeastern Oklahoma's portion of the McAlister basin has bounced back onto the exploratory scene after a period of considerable lull.

Branan & Farrell 1 Lackey, SE SE NE 14-12n-16e, flowed 20,000 M.c.f. of gas per day at 2,230 ft. This strike plus the recent discovery of Oklahoma Natural Gas Co. at 1 Popejoy in 17-10n-13e has put new exploratory emphasis on the area where Okmulgee, Okfuskee, and McIntosh counties join. The Popejoy discovery flowed more than 10,000 M.c.f. per day from Gilcrease, Cromwell, and Jefferson sands. Later additions to this area's growing esteem include James C. Meade's 1 Bridges in SW SE NE 31-11n-13e. This Cromwell sand well on the Okmulgee County side of the play flowed more than 1,000 M.c.f. per day. The Jefferson yielded 4,000 M.c.f. per day, and the Wilcox sand got 7,000 M.c.f. plus per day. These discoveries in an old area will give new life to a basin that has lacked in interest in recent years.

SOUTHWEST TEXAS

Duval County Still Holds Top Spot in Oil Activity

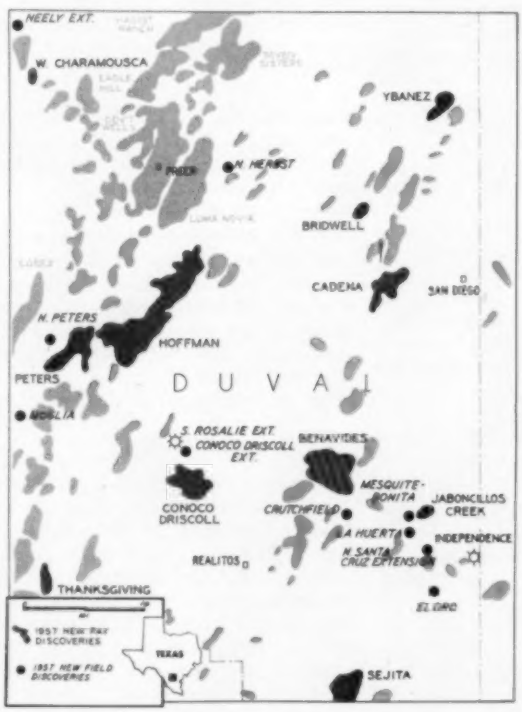
DUVAL COUNTY, scene of some of the earliest exploration in South Texas, and extensively developed in waves of drilling over the years, continues a happy hunting ground for new oil and gas production.

For several months it has been leading all South Texas counties in drilling activity, both in wildcatting and in development in and immediately around producing areas.

Despite the large number of fields already found and the widespread productive area embraced by them, oil and gas discoveries still are being made in this country in rapid succession. Discoveries this year may exceed those in any previous year.

So far this year, with a month and a half yet to go, there have been at least 26 new discoveries in the county. Nine of these are classed as opening new fields. Three others are major extension discoveries although identified with some existing field. The remainder, totalling 14, uncover additional productive horizons in their respective fields.

The active drilling play which has been going on in the county is indicated by the more than 270 wells which have been completed so far this year. Of these, 122 have been completed as oil, and 16 gas wells. This represents an over-all success ratio of a little more than 50 per cent. Of the total, more than 85 could have been classed as wildcats at the time



Here are this year's oil and gas discoveries to date in Duval County, which continues a happy hunting ground for new fields in South Texas. For key to discoveries shown see listing on opposite page

→

they were drilled; that is, they were at least a mile from any existing production.

There now are between 25 and 30 active operations in the county, exclusive of new locations. These are scattered over 18 to 20 different areas, of which 7 are listed as wildcat. Drilling in the county has kept up fairly steady all year at this rate, and with the new prospective development in the making, there appears to be no letup in sight within the early future.

The greatest concentrations of drilling have been in the Johns and Jaboncillas Creek areas. Development of Hockley oil reservoirs in and immediately around Johns field has accounted for 27 of this year's wells. This field, located west of the older Fitzsimmons field, northwest of San Diego, was discovered in 1956. It has continued active since then with pays at 3,500 to 3,600 ft.

Twenty-six wells have been completed so far this year in the immediate Jaboncillas Creek area, southeast of Benavides, where active development of at least two separate Frio zones has been carried on since discovery of this field in 1955.

Others of the more active local areas this year include Peters with 20 wells (including East Peters and the new North Peters area); Seven Sisters, 12 wells; and Conoco-Driscoll and Thanksgiving fields with 11 wells, each, at this counting.

Duval County dates its productive history to the latter part of the last century (1898) when shallow gas production (160-200-ft. Miocene sand) was discovered at Piedras Pintas, a shallow piercement-type salt dome about 2 miles northeast of Benavides. First appreciable oil production, however, goes back to 1924 with the discovery of Cole and Driscoll fields.

In the succeeding exploratory waves, more than 150 separate and distinct fields have opened, including such large and well-known fields as Government Wells, Loma Novia, Seven Sisters, Benavides, Hoffman, and Lopez. Many of the county's fields are productive from more than one horizon with multiple sand zones and reservoirs in each.

Duval County's producing horizons run through a wide range of the geological column from shallow Miocene sands to the deeper Eocene-Wilcox horizons. They extend in depth from sands above 1,000 ft. to the currently deepest Wilcox production, in the Hagist Ranch area, below 9,000 ft. The varied potentialities for production, all far from exhausted, make Duval, and its adjoining lower Texas counties particularly attractive for more intensive exploration.

TEXAS PANHANDLE

Lipscomb County Wildcat Completed in Morrow

A new Morrow-Pennsylvanian sand gas-condensate discovery was completed in Lipscomb County in the northeastern sector of the Texas Panhandle. The discovery well is Humble Oil & Refining Co. 1 John B. Doyle, 11 miles north of Higgins and ½ mile west of the Oklahoma line.

The well flowed 1,550 M.c.f. of gas per day plus an estimated 20 bbl. of condensate per million from perforations in the Morrow sand at 9,600-10 ft. Nearest production is about 3¾ miles away to the southwest at Humble 1 Price.

1957 NEW-FIELD AND MAJOR EXTENSION DISCOVERIES

Field and discovery operator—	Disc. month	Producing zone	Pay depth (ft.)	Type prod.
Mogila—Sunray Mid-Continent	Jan.	Upper Queen City	5,774-80	Oil
North Santa Cruz—Head-Welsh	Jan.	Upper Frio	3,188-93	Oil
Crutchfield—Oil Corp.	Feb.	Pettus	5,788-94	Gas-Cond.
South Rosalie (Ext.)—Continental	April	Jackson-Cole	2,557-63	Gas
Conoco-Driscoll (Ext.)—Continental	May	Jackson	2,791-92	Oil
North Herbst—L. G. Shelly	June	Loma Novia	2,794-2,800	Oil
Independence—Farenthold-Pitcairn	July	Frio	3,152-60	Gas
Mesquite-Bonita—Bryan-Sibley	Aug.	(Frio-Sibley	3,042-49	Oil
		(Frio-Bryan	3,092-99	Oil
El Oro—Head-Welsh	Aug.	Frio	3,280-84	Oil
North Peters—H. H. Howell	Sept.	Queen City	5,724-40	Oil
Neely (Ext.)—L. D. Cain	Sept.	Jackson-Bruni	1,840-55	Oil
La Huerta—Morgan	Oct.	Frio-Ramon	3,112-21	Oil

1957 NEW-PAY DISCOVERIES

Field and discovery operator—	Disc. month	Producing zone	Pay depth (ft.)	Type prod.
Jaboncillos Creek:				
Sunray Mid-Continent	Jan.	Frio-New Year	3,052-67	Oil
Ada Oil Co.	June	Frio-Ramon	3,108-16	Oil
Cadena—G. L. Rowsey	Jan.	Yegua 1	4,650-60	Oil
	Jan.	3rd Hockley	4,600	Oil
Hoffman—Duval Oil Co.	Jan.	Jackson-Mirando	2,945-47	Oil
Ybanez—S. H. Howell	Jan.	Pettus	4,614-24	Gas
West Charamousca—Humble	Mar.	Jackson	2,176-84	Oil
Sejita—Standard of Texas	Mar.	Yegua-Dolores	7,171-77	Oil
Peters—Katz Oil Co.	Mar.	2nd Queen City	5,684-5,712	Oil
Conoco-Driscoll—Continental	April	Frio-2,400-ft.	2,443-55	Gas
Thanksgiving—Killam-Hard	July	Yegua "B"	3,189-93	Oil
Bridwell—C. C. Winn	July	Hockley	3,542-43	Oil
Benavides—Concord	Aug.	Yegua	5,525-24	Oil
North Herbst—Texas Co.	Oct.	Loma Novia	2,792-2,800	Oil

NEW MEXICO

SOUTHEAST

Shelf-Shore Fields Get Pennsylvanian Prospect

The Shelf-Shore area fields skirting the northern border of Delaware basin had another pre-Permian discovery in the making last week. El Paso Natural Gas Co. 1 Leonard-State, SW NW 22-17s-29e, in northern Eddy County, had a possible 400-ft. oil or gas-distillate Pennsylvanian section.

This big area has come in for intensive study and deep exploration over the past year, yielding successes over the last few months. On some maps it is labeled as Northwestern Shelf Fields, and stretches eastward from Artesia across northern Eddy County, along the old Artesia-Maljamar-Vacuum trend, into central Lea County.

The latest deep discovery prospect is 20 miles east of Artesia in the Grayburg-Kelly field area. Drill-stem tests have flowed gas or recovered oil from 10,638 to 11,066 ft. Gravity of the oil ranged from 42° to 54°.

Operators cored shale with small shows at 10,712-22 ft., and recovered additional shale to 12,722 ft. Initial drill-stem test making a good gas flow was at 10,638-10,712 ft. Gas surfaced in 3 minutes, with mud and distillate in 18 minutes. Gas volume was at the rate of 14,000 M.c.f. per day. Recovery included 240 ft. of 42°-gravity oil.

At 10,682-10,734 and 10,638-10,712 ft., gas volume remained about the same. Flowing pressure ranged to 3,500 psi.

At 10,734-71 ft., gas flow was 5,020 M.c.f. per day, plus 6 bbl. of 54°-gravity oil an hour. Flowing pressure was 1,040 psi. maximum, and shut-in pressure read 4,525 psi. in 1 hour. A 3½-hour test at 11,056-66 ft. showed a small gas volume and recovered 550 ft. of 48°-gravity oil. Flowing pressure was 190 psi., and reported shut-in pressure was 7,485 psi. in 1 hour. Operators plugged back from 11,441 ft. to 11,100 ft. for completion attempt.

OKLAHOMA

SOUTH-CENTRAL

Good East Bradley Well Finaled in McClain

McClain County's East Bradley field added a two-pay well at Sun Oil Co. 1 Odom in C SW NW 33-5n-4w.

The well flowed 332 bbl. of oil in 7½ hours on 26/64-in. choke from Bromide - Ordovician perforations at 11,074-94 ft.; this is a daily rate of 1,062 bbl. From the Hart sand at 8,168-86 and 8,218-46 ft. the well made 4,358 M.c.f. of gas per day plus 63 bbl. condensate in 8 hours.

Deep Knox Play Extended

British American Oil Producing Co. 1 Brickel, C SW NE 4-2n-5w, Stephens County, extended the deep Knox field again. The well flowed 2,280 M.c.f. of gas per day, extending production on the south side of the deepest producing area in Oklahoma. The deep record-holder here is the 1 Krieger in C SW SW 3-2n-5w. It flowed gas-condensate from Oil Creek at 16,490-16,612 ft. to establish the state record. The well has now plugged back to the Second Bromide for tests at 14,805-82 ft. It flowed 3,400 M.c.f. of gas per day and 70 bbl. condensate here.

NORTHEAST

Third Producer in Line For Northeast Catesby

New Northeast Catesby field in Ellis County has a third gas producer. It is Shell Oil Co. 1 White, C NE SW 31-24n-25w. The well flowed 1,620 M.c.f. of gas on tests of the Morrow-Pennsylvanian lime at 8,079-89 ft.

Shell has staked location for another well in the field, the 1 Tubb, C SW NE 30-24n-25w. Pan American Petroleum Corp. has entered this northwestern Oklahoma campaign at 1 O'Hern Unit in C SE SW 33-24n-25w, and also have found gas shows at the 1 Moore in C SE NW 14-21n-23w, eastern Ellis County.

NEVADA

Casing Readied for Las Vegas Wildcat

Bonanza Oil Corp. was waiting on 9¾-in. casing for 1 Government Consolidated, a wildcat in 31-21s-60e in Clark County about 6 miles southeast of Las Vegas. Depth of the cable tool drilled hole was 790 ft.

WEST TEXAS

Husky's Devonian discovery in Martin County, and 17 other strikes completed in a 2-month period.

Steady Discovery Rate in Old and New Areas

WHEN you ask the big company boys charged with bringing in new oil reserves where their next field is coming from, chances are they start talking in terms of new provinces, entirely new areas. And there are new and distant lands being opened up.

Meanwhile back in the jungle of our old producing areas, oil finders of West Texas have kept up a steady discovery rate. These include new fields, new pays, or old wells reworked. Wherever they are, whether in old producing fields, or outside proved limits, they have provided a steady flow of new oil and have kept the majority of available rigs busy over the year.

The accompanying map shows 18 discoveries spread over seven counties in the central portion of West Texas. Completion date on most of these discoveries is within the past 2 months. The pay section is indicated, which ranges from the San Andres of Middle Permian age, to the Ellenburger which is lower Ordovician in geologic age.

Only a small percentage of these new wells are in the questionable pay-out, or stinker class. Quite a few of them rate in completion potential with Husky Oil Co. and Pano Tech Exploration Corp. 1 Breedlove in northwestern Martin County, completed last week as a flush Devonian pool opener making 536 bbl. of oil a day.

Completion details were: Tubing choke, 10/64-in., tubing pressure, 1,150 psi.; gravity of the oil was 41.4°. The pay section was perforated from 12,005-55 ft. Top of the Devonian was logged at 11,997 ft., on ground elevation of 2,895 ft., giving it a subsea datum of 9,102 ft.

No. 1 Breedlove is located in the SW SW of Tract 92, League 248, Briscoe County School Lands Survey, 10 miles southwest of the town of Patricia in bordering Dawson County. It is on a block of 1,515 acres which were assembled on the basis of a seismic program made earlier this year. Husky Oil has 65 per cent gross working interest in the acreage and Pano Tech Exploration has the remaining 35 per cent. The new well is within 1 mile of a pipeline outlet and marketing arrangements are said to have been made. Operators said a

second test on the block would start within 30 days.

Ask a West Texas operator where his next field is coming from and he probably will start looking around in his own county.

MICHIGAN

Extensions Boost Activity In Old Edmore Field

A good drilling play is in prospect for the old (1933) Edmore field, Montcalm County, with extensions on the west and northeast.

Osceola Refining Co. 1 Peterson SE NE 2-12n-6w, swabbed 12 bbl. day natural from Traverse lime at 3,077 ft. and will be acidized. Location is ½ mile northeast of developed area.

Glendenning and Mutch 1 Jensen SE NE 9-12n-6w, ½ mile west of the developed area, is flowing 35 bbl. oil day restricted from Traverse lime pay at 3,090 ft. Five new locations have been surveyed.

Scipio Play Receives First Disappointments

First setbacks to Scipio oil play in Hillsdale County were reported and chilled some of earlier optimism for major field.

Perry, Nelligan and Gordon 1 Nelligan SE NE 9-5s-3w, logged Trenton at 3,523 ft. and bottomed at 3,961 ft. for orders. Test is located ¾ mile due west of four previously drilled Trenton oil wells. No commercial shows were reported.

Aurora and McClure 1 Barnett NE SW 10-5s-3w, diagonal southwest offset to producer, bottomed at 4,020 ft, after drilling Trenton at 3,516 ft without oil or gas show

Since August 1 this year approximately 450,000 acres have leased in Hillsdale, Calhoun, Branch, Jackson and Lenawee counties with Sun, Ohio, Gulf, and Carter taking acreage spreads.

ROCKY MOUNTAINS

WYOMING

New Gas Strike Reported In Green River Basin

The Green River basin in southwestern Wyoming apparently has a new gas field as a result of successful operations at Caulkins Oil Co. 8-8 Federal in C SW SW 8-15n-104w, Sweetwater County.

The indicated discovery flowed gas at the rate of 5,000 M.c.f. per day on drill-stem test of a yet unidentified formation. Location of the discovery is about 3 miles south of production at South Baxter Basin field. Production there is from the Frontier at 2,300 ft. and from the Dakota at 3,000 ft. The operator hasn't released details of the test or the formation that was tested.

UTAH

West Aneth Field Well Completed

A well on the west side of Aneth field in San Juan County, Paradox basin, has been completed flowing 1,128 bbl. of oil per day plus 1,052 M.c.f. of gas per day on 40/64-in. choke. It is Three States Natural Gas Co. 1 Rice, C NE NE 23-40s-23e. Production is from the Paradox "C" Pennsylvanian zone.

Big Flat Mississippian Discovery Completed

The Grand County Mississippian discovery at Big Flat has been completed for a flow of 319 bbl. per day from perforations at 8,694-7,728 ft. Pure Oil Co. 1 Unit, C SW SE 14-26s-19e, is at the north end of the

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Paradox basin and is the first Mississippian production of commercial value in the entire region of Colorado, Utah. Nearest Mississippian production is in Wyoming.

The operator has installed hot line for paraffin control and will pump the discovery well. Location of Pure's well is 12 miles southwest of the town of Moab.

CALIFORNIA

Union Confirms Fruitvale Find

Union Oil Co. of California confirmed its recent discovery in the West Fruitvale area, Kern County, with a flowing offset one location north of the pool discovery. The offset, 25-17 KCL, was completed in a Chanac sand interval above 4,233 ft. Initial production was 330 bbl. in 21 hours of 19.5°-gravity crude with a 14/64-in. choke. This offset proved to be a much better well than the discovery which is a pumper making just 100 bbl. daily.

Mount Poso Extended

Trico Oil & Gas Co. extended production in the Mount Poso field, Kern County, about ½ mile southeast of the nearest producer. The well, 10-2 USL, was completed on the pump for 10 bbl. daily of 14.5°-gravity crude from 14 ft. of perforations above 1,305 ft.

New Pool Discovery At Gato Ridge

Lipkin and Devine, operators, hit a new pool discovery in the Howard Canyon area of Gato Ridge field, Santa Barbara County with a 3,900 ft. wildcat in 8-8n-32w. The well was plugged back and redrilled to 2,857 ft. where it bottomed in a new Saquoc sand pool. The well was selectively perforated between 1,242 ft. and 2,856 ft. Initial production was 20 bbl. daily of 16°-gravity crude, 13 per cent cut. M J M & M Oil Co. holds a 50 per cent interest in 875 acres surrounding this discovery.

Tidewater Scores at Buena Vista Hills

Tidewater Oil Co. was installing production facilities for additional tests on a wildcat in the Buena Vista Hills field area which gave strong indications of being an important Stevens sand new pool discovery on

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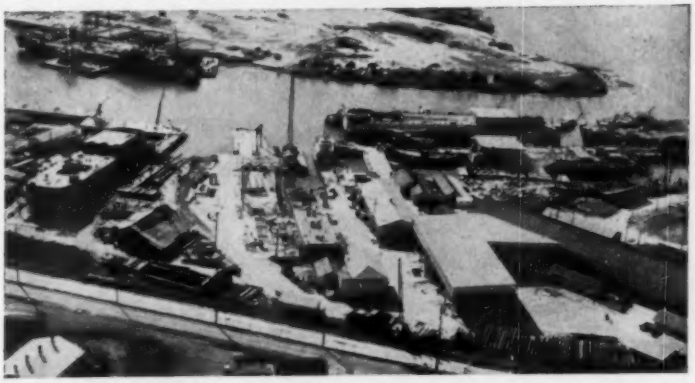

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an earlier test. The well, 1 Tidewater-Richfield-USL, has 150-ft. of zone open between 5,059 and 5,199 ft. It flowed 31.2°-gravity oil at a rate of 400 bbl. daily on the first test.

LOUISIANA

SOUTH

Production Opened in New Iberville Area

Aluminum Co. of America has a new oil discovery 3½ miles northwest of Bayou Choctaw field, in northeastern Iberville Parish.

It is in its 1 Schwing, in 43-8s-11e, completed with a flow rate of 525 bbl. of 35°-gravity oil per day, gaged through ⅝-in choke. Its pay, in hole drilled to 12,021 ft., is perforated at 11,224-30 ft.

Flow of the well is with gas-oil ratio of 989 cu. ft. per barrel and pressure of 2,400 psi.

Location is less than ½ mile from the West Baton Rouge Parish line. It is about midway between Bayou Choctaw field and Grosse Tete field, northwest of it.

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NORTH

Three Pays Tested in Calhoun Confirmation

A major multiple-pay gas-condensate field seems assured for the Calhoun area of Ouachita Parish, where Arkansas Louisiana Gas Co. has tested three indicated prolific gas zones in its second well, a mile east of its recently completed discovery well for the area.

The new well is the 1 Fuller, located about 14 miles west of Monroe, and on the same block of approximately 6,000 acres as the 1 Pipes, deep discovery which Arkansas-Louisiana owns.

At three separate intervals in the Travis Peak formation between 7,183 and 7,417 ft., the Fuller well tested for a cumulative total of 4,600,000 cu. ft. of gas per day on ⅜-in. bottom-choke and ¼-in. top-choke. These same zones were encountered in the discovery well with good production indicated from each. Unestimated amounts of liquid (condensate) were produced in all three zones in both wells.

The Fuller well will be carried to approximately 9,200 ft. to test the lower Travis Peak and Cotton Valley sands. It was in the Cadeville sand of the Cotton Valley series that the discovery well was completed at a depth of 9,124 ft. Its open-flow tests gave a potential production rate of 7,100,000 cu. ft. of gas and 1,879 bbl. of condensate per day.

Successful Wildcats

OKLAHOMA

Stephens County: Hefner Production Co. 1 Parker-Hefner, C NE NW NE 9-1s-5w. IPF 588 BOPD, Sims 6,280-90 ft., Goodwin 6,606-65 ft. TD 6,805 ft. New pay (Sims) in Sho-Vel-Tum field.

Tillman County: Cities Service Oil Co. 9 Kunc, SE SW 34-2s-17w. IPF 418 BOPD, Strawn 3,945-50 ft., Arbuckle 4,614-30 ft. TD 4,630 ft. New pay (Arbuckle) in Frederick Southeast pool.

Bolin Oil Co. and Amerada Petroleum Corp. 1 Colyer, C NW NW 32-3s-16w. IPP 128 BOPD, 38° gravity, Strawn congl. 5,100-30 ft. TD 5,228 ft. Oil discovery.

Garvin County: George E. Cameron, Jr., 1 Sultan, NW 23-4n-1w. IPF 360 BOPD, 43° gravity, first Bromide 4,400-10 ft. TD 4,490 ft. New pay in Southwest Paoli field.

Kiowa County: B. L. Hoover 1 Oklahoma State, NW NW SW 28-6n-16w. IPP 5 BOPD, 33° gravity, granite wash 284-300 ft. TD 555 ft. Oil discovery.

Greer County: El Paso Natural Gas Co. 1 Tandy, NW 11-7n-24w. IP 940 M.c.f. of gas per day, Brown dolomite 1,650-1,688 ft. TD 1,749 ft. Gas discovery.

McClain County: Pasotex Petroleum Co. 1 Hubbard-Walsh, SW NE NE 26-7n-

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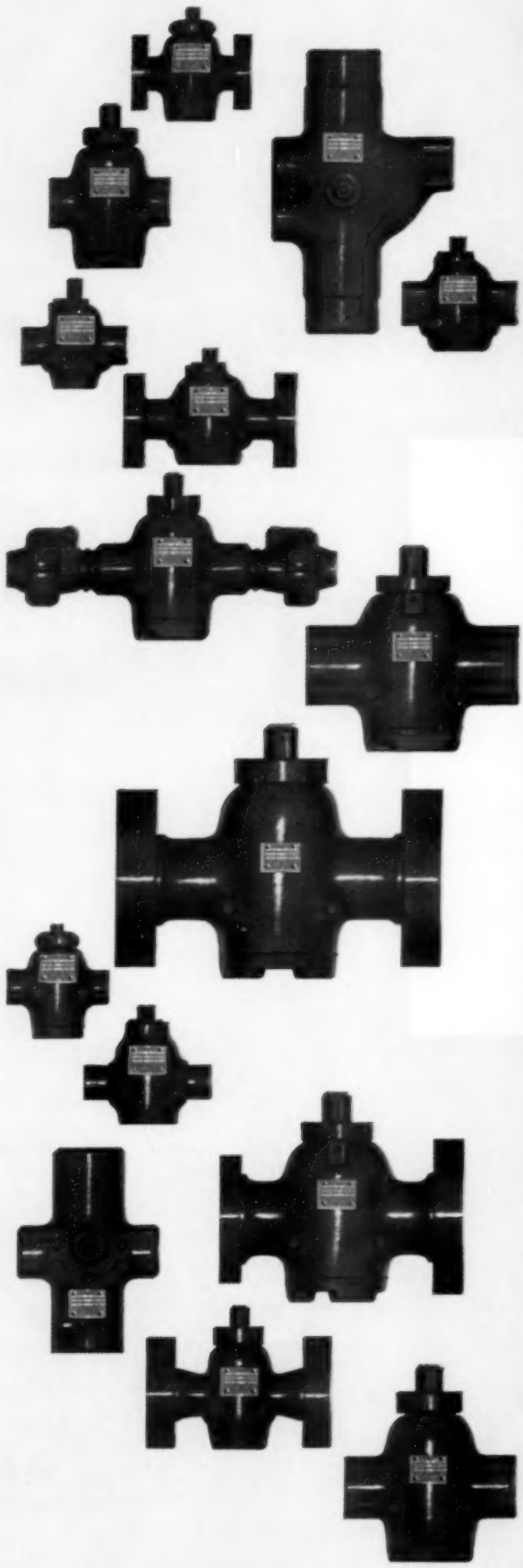

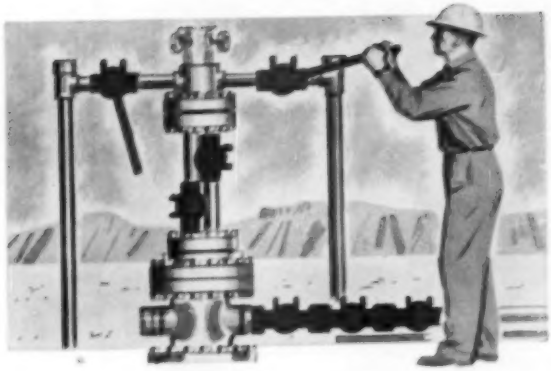

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2w. IPP 9 BOPD, 38° gravity, Viola 7,650-70 ft. TD 8,995 ft. Oil discovery.

Pottawatomie County: Johnson-Bates Drilling Co. 1-A Brunc, C SW NE 25-7n-4e. IPF 240 BOPD, 40° gravity, Senora sand 3,004-10 ft. TD 4,134 ft. New pay In St. Louis district field.

Cleveland County: Oil Capitol Corp. 2 Allen, NW SE NE 32-8n-1w. IPF 352 BOPD, Viola 7,215-40 ft., Wilcox 7,456-74 ft. TD 7,762 ft. New pay in South Rocky Point field.

Eason Oil Co. 1 A. L. Wilcox, NW 35-9n-2w. IPF 1,338 BOPD, Wilcox 7,719-24 ft., Oil Creek 8,424-34 ft. TD 8,503 ft. Oil discovery.

McIntosh County: Oklahoma Natural Gas Co. 1 L. W. Popejoy, NW SW NE 17-10n-13e. IPF 13,990 M.c.f. of gas per day, Gilcrease 2,598-2,630 ft., 2,758-64 ft., upper Cromwell 3,138-47 ft., 3,159-76 ft., Jefferson 3,266-77 ft. TD 4,010 ft. Gas discovery.

Okfuskee County: C. L. Pardo Oil & Gas Co., Inc., 1 Eugene Moon, SE SE NE 8-12n-10e. IPP 3½ BOPD, 6 BW, 34°, Booch, 2,624-29 ft. TD 3,512 ft. Oil discovery.

Logan County: Humphrey Oil Co. and Jones, Shelburne & Pellow No. 1, C NW SE 24-15n-2w. IPP 7 BOPD, 3 BW, 40° gravity, Layton 4,620-30 ft. TD 4,705 ft. Oil discovery.

Creek County: Hubbell Drilling Co. 1 Peter Harjo, SEc 36-15n-6e. IPF 42 BOPD, 42° gravity, Prue sand 2,930-44 ft. TD 3,700 ft. New pay in North Key West pool.

Logan County: Lario Oil & Gas Co. 1 Ross McKean, NE NE NW 15-16n-3w, IPF 222 BOPD, 42.2° gravity, Viola 5,990-95 ft. TD 6,259 ft. Oil discovery.

Big Chief Drilling Co. 1 Graff, NE 33-17n-4w. IPF 290 BOPD, 38° gravity, first Wilcox 6,465-6,512 ft. TD 6,640 ft. TD 6,640 ft. New pay in Cresent pool.

Kingfisher County: Utah Southern Oil Co. 1 Hill, SW 3-18n-9w. IP 1,500 M.c.f. of gas per day, Inola 7,254-64 ft., upper Parvine 7,350-77 ft., 7,450 ft., lower Parvine 7,424-25 ft., and 7,408-10 ft. TD 9,330 ft. New pay discovery in Southwest Lacey pool.

Noble County: Shell Oil Co. 1 V. P. Biggs, SW 20-20n-1e. IPF 109 BOPD, Cleveland 4,239-46 ft., Miss chat 4,858-4,911 ft. TD 4,911 ft. New pay (Miss.) in Lone Elm South field.

Pawnee County: R. L. Horn & Sons 1 Manning, NE NE SW 20-22n-5e. IPF 200 BOPD, 20 BW, 39.5° gravity, Skinner sand 3,216-26 ft. TD 3,460 ft. Oil discovery.

Osage County: Riverside Oil Co. 1 Big Eagle, SW SE SE 5-22n-8e. IPF 144 BOPD, 37° gravity, Skinner sand 2,489-2,512 ft. TD 2,556 ft. New pay in South Hominy Lake field.

Harper County: Shell 1 State, C NW SE 36-28n-25w. IPF 21,500 M.c.f. of gas per day, 21 BDPD, 65° gravity, Chester 6,476-6,556 ft. TD 6,998 ft. Gas-distillate discovery.

KANSAS

Columbia County: Phillips Petroleum Co. and Carter Oil Co. et al 1 Talley "B," SEc 1-20s-22w. IPF 149 BOPD, 44.8° gravity, Cotton Valley 9,164-84 ft. TD 12,707 ft. Opens Plainfield pool.

Cowley County: Bob Jones et al. 3 Collinson, SW NE SW 21-33s-4e. IPP 25 BOPD, 50 BW, 38° gravity, Layton 2,464-70 ft. TD 3,178 ft. New pay (Layton) in Posey pool.

Graham County: Jones-Shelburne & Farmer 1 Ellsworth, SE NW NE 17-8s-23w. IPP 104 BOPD, 39° gravity, Lansing 3,644-49 ft. TD 3,675 ft. Opens Northeast Higer field.

CRA and Ted Gore 1 Wilson "K," SW SE SW 32-8s-23w. IPP 36 BOPD, 73 per cent water, 38° gravity, Lansing 3,818-21 ft. TD 3,925 ft. Opens Northwest Rush Creek field.

Cook & Galloway Drilling Co. 1 Johnson, SW SW NE 6-10s-23w. IPP 58 BOPD, 43.2° gravity, Lansing 3,939-45 ft. TD 4,035 ft. Opens Northwest Hoof pool.

Ellis County: Shade & Berry 1 Madden, SW NW NE 16-11s-18w. IPP 97 BOPD, 35° gravity, Lansing 3,162-70 ft. TD 3,251 ft. Opens Neddam pool.

Union County: Trimble Drilling Co., Inc., 1 Southern Co. C SW SW NE 1-16s-14w. IPP 79 BOPD, 27 BW, 39.2° gravity, Hosston 3,467-69 ft. TD 3,541 ft. New pay in Calion pool.

Rush County: Jones-Shelburne & Farmer 1 Kuhn "B," SW SW NE 14-16s-17w. IPP 100 BOPD, 37° gravity, Lansing 3,352-59 ft. TD 3,547 ft. Opens Northeast Loretto pool.

Aurora Gasoline and Rex & Morris and CRA 1 Young, SW SW NW 19-17s-20w. IPP 136 BOPD, 40° gravity, 4,090-93½ ft. TD 4,280 ft. Opens McCracken pool.

Kingman County: Stelbar Oil Corp. 1 Moorehouse, NW NW NW 20-28s-5w. IP 2,100 M.c.f. of gas per day, Miss. 3,852-60 ft. TD 3,912 ft. Opens Moorehouse pool.

Pratt County: Aurora and Graybol 1 Morrell, SW SW NE 10-29s-14w. IPP 32 BOPD, 33° gravity, Marmaton 4,439-44 ft. TD 4,698 ft. Opens Rell pool.

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And if the selection were left to Grimes' associates at Cosden Petroleum Corp., he'd win hands down.

Grimes was recently named general superintendent of all three Cosden refineries after 11 years of unusual success as superintendent of the firm's first and biggest plant at Big Spring, Tex.

When he took over in 1946 at Big Spring, the refinery had a crude charge capacity of only 12,000 bbl. daily. A crude unit, a thermal unit, and a poly plant were the sum of its facilities.

Now plant capacity is up to 32,000 bbl. daily. But this tells only half the story. Cosden in the past 11 years has added roughly a dozen new process units—complex facilities such as a vacuum unit, cat cracker, BTX and alkylation units, Rexformer, and a styrene plant.

It was Grimes' responsibility to get these units built at reasonable cost and on time; to expand operating and maintenance forces and have them ready for the new duties and problems; and to see that the whole operated efficiently and at maximum profit. He did it smoothly.

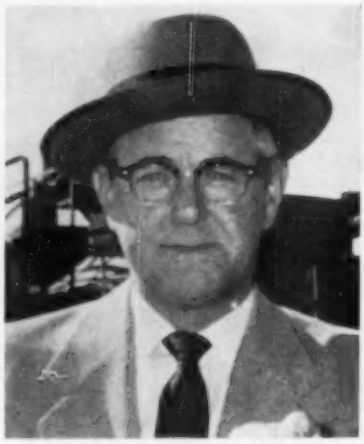
"Grimes isn't a spectacular sort of individual," a Cosden official says, "but he's done a spectacular job. And he's done it so quietly and consistently that you don't realize what a task he's had unless you look back and see what the plant was like 10 years ago."

Dan Krausse, vice president in charge of manufacturing for Cosden, is one of Grimes' staunch admirers.

"Soon after George was named superintendent, we tossed the new cat cracker in his lap. A tough assignment.

"Later we decided to add a BTX unit. George took crude-unit operators who did well to cut product within 200° to 300°, and soon had them cutting 1° benzene.

"Next we added an HF alkylation unit. To hear the older operators talk about anhydrous hydrofluoric acid would scare the heck out of you. But George supervised training for operators on the alky unit, showed them what you could and couldn't do with acid, and to this date we haven't had a single lost-time acid accident.



GEORGE GRIMES
. . . there's no fat left in his deals.

"Grimes' dispatch and efficiency in handling such tough technical problems is all the more remarkable when you consider that he hasn't had the benefit of a formal education. Many, many men with his background would have fallen by the wayside."

If you want to describe George, Krausse says, these are the adjectives to use: Steady, easy-going, sensitive, well-liked by everyone at Cosden. He is quick to recognize what few limitations he has and knows where to go to get help. He has no technical background but he makes good use of those who do.

A hard trader . . . One of his greatest abilities, says Vice President Marvin Miller, is in purchasing and expediting refinery equipment. He is known by suppliers, somewhat ruefully, to be a hard trader. There's no fat left in a deal he's negotiated.

Likewise, a supplier can count on little rest or peace of mind until delivery is made on schedule; but, as an associate put it, the suppliers also know "that each will get a fair shake as long as he stays competitive."

What does Grimes have to say about his career? About what you'd expect from the above description: He doesn't see that he has done anything special.

When asked about supervisory difficulties in the past decade caused by the octane race, automation, mushrooming technology, and multiplying processes, Grimes said simply: "Refining technology has grown all right, but it still is the same old pattern of fractionation. Just more precise."

Charter member . . . Grimes is one of the real veterans in the refining industry. Born in Marshall, Mo., in 1906, he moved to Oklahoma in 1925 to go to work for Marland Oil Co. (now Continental Oil Co.) at its Ponca City refinery.

He joined Cosden at Big Spring in 1929 as still man on the crude unit—in time to help run the first barrel of oil processed by that refinery.

In 1933, he was promoted to night superintendent, then in 1939 moved up to superintendent of the plant Cosden formerly operated at Graham, Tex. Grimes came back to Big Spring in 1945 in charge of all still operations and was promoted to plant superintendent the following year.

In his new job, he will be responsible for operation, maintenance, and personnel welfare at the three Cosden refineries at Big Spring, Abilene (Hawley plant), and Colorado City.

Harley M. McCamish, former chief engineer of the Sui-Karachi Gas Transmission Pipeline of Pakistan, has been named manager of Mountain Fuel Supply Co.'s pipeline division. He will headquarter in Rock Springs, Wyo.

P. E. Fletcher, Atlantic Refining Co., Midland, Tex., has been elected new chairman of the Permian Basin chapter of the American Petroleum Institute Division of Production. Other new officers include **J. W. Sallee,** Cardinal Chemical Co., Midland, first vice chairman; **D. L. Kastner,** Cities Service Oil Co., Odessa, second vice chairman; and **H. G. Wesberry,** Tidewater Oil Co., Midland, third vice chairman.

H. Dix Fowler, assistant chief engineer for Trans-Canada Pipe Lines, Ltd., has been promoted to vice president in charge of engineering and operations. Fowler has been with Trans-Canada since 1954. He was resident engineer on compressor station construction for Gulf Interstate Gas Co. before joining Trans-Canada. A graduate of Stanford University, Fowler was supervising engineer for Trans-Canada before being named assistant chief engineer last year. As vice president in charge of engineering and operations, he will be responsible for all phases of engineering, construction, and operation of the natural-gas system.

Personals

D. W. FARNHAM

D. W. Farnham has been appointed foreign - operations superintendent for Pan American Petroleum Corp.; **J. D. Wells** has been named assistant to the chief engineer; and **G. F. Moore** becomes assistant sales superintendent in charge of natural gas sales contracts. Since 1954, all three had been at the Brownsville, Tex., plant of Amoco Chemicals Corp., Pan American affiliate. They will now headquarter in Tulsa. Farnham will coordinate Pan American's drilling and production in the Caribbean area in his new position. He has been with the company since 1946 and was synthesis superintendent at the Brownsville plant. Wells was chief mechanical engineer, manufacturing; marine operating superintendent for Gulf of Mexico; and chief mechanical engineering supervisor for Pan American before transferring to Amoco as chief mechanical engineer at Brownsville. Moore was chemical plant superintendent at Brownsville and served as Pan American's operating superintendent, plants, before his assignment there.

J. D. WELLS

G. F. MOORE

Dr. Guy Waddington, National Research Council, Washington, has been nominated for the 1957 southwest regional award of American Chemical Society. Waddington was formerly with the Bureau of Mines' petroleum experiment station in Bartlesville, Okla. He received the Department of Interior's Distinguished Service Award in 1953.

Fred L. Oliver, De Golyer & MacNaughton, has been elected 1958 chairman of the Dallas section of American Institute of Mining, Metallurgical, and Petroleum Engineers. Other new officers are **Weldon L. Porter,** Welex, Inc., first vice chairman; **J. H. Sullivan,** regional petroleum engineer for Atlantic Refining Co., second vice chairman; **R. E. Vickrey,** senior gas engineer at Sun Oil Co., treasurer; **W. F. West,** trustee for estate of J. B. Stoddard, secretary.

William Allen Kuhn, Gulf Oil Corp.'s geologist, production, in Harvey, La., has been promoted to geologist, exploration, in New Orleans.

Philip A. Kahle, Jr., Frontier Refining Co.'s vice president in charge of manufacturing and manager of the Cheyenne, Wyo., refinery, has been elected a director.

R. E. Whitmore has been named district geophysicist at Atlantic Refining Co.'s Billings, Mont., office. He replaces **Hugh McCain,** who was recently transferred to Calgary. **Jim Barkdull,** geologist for the company in Dallas, has been transferred to Billings.

Robert A. Buschman has been named president and general manager of Field Drilling Co., San Antonio, Tex. Buschman succeeds **Field Davis. Tom Neal,** formerly with Dillard & Waltermire, Inc., has joined Field Drilling as field superintendent. He replaces **Joe Bates.** Neal will headquarter in Alice, Tex.

George E. (Ed) Porter, assistant to the vice president of Camdrill International, Inc., in Compton, Calif., has been transferred to Tripoli, Libya, as assistant to **Scott A. Murray,** manager of Mid-East and Mediterranean operations. **Larry D. Cannon** has joined the company in Compton replacing Porter. He was formerly drilling and production engineer with Drilling & Exploration Co., Inc. Camdrill is a subsidiary of Southern California Petroleum Corp.

D. B. Benedict has been elected a vice president in charge of chemicals and plastics activities of Union Carbide Corp. Benedict was formerly president of Union Carbide Chemicals Co., a division of the corporation. **E. E. Fogle** will succeed Benedict as president of the chemicals company. **H. D. Kinsey,** vice president of Union Carbide Chemicals, has been named president of a new division of the corporation, Union Carbide Olefins Co. Kinsey has been with Union Carbide since 1924. The new company will handle production and sale of the corporation's hydrocarbon products including ethylene, propylene, and butadiene. Other officers of Union Carbide Olefins are **R. N. Graham,** executive vice president; **W. F. Reich, Jr.,** executive vice president; **N. C. Babcock,** vice president, marketing; **L. J. Bowditch,** vice president, engineering; **G. T. Felbeck,** vice president, research; and **E. P. Shetter,** vice president, production.

W. L. Banks, manager of the Tulsa office of Davison Chemical Co.'s petroleum catalyst division, has been appointed consulting technologist for Western Petroleum Refiners Association. He will headquarter in Tulsa. Banks was research and development engineer with The Texas Co. at one time and served during World War II in Europe as technical representative of the chief of the Chemical Corps. He has also been a division chief for the Central Intelligence Agency in Washington. He is a graduate of the University of Missouri.

J. H. Morrill has been promoted by Southland Royalty Co., Fort Worth, from chief geologist to vice president in charge of exploration. **F. A. Knapp** moves up from treasurer to vice president and treasurer of the company.

Nikita Harwich, president of Servicios Hydrocarb, C.A., Caracas, Venezuela, has been elected a director of San Jacinto Petroleum Corp., and a member of the executive committee and a director of San Jacinto Venezolano, C.A., San Jacinto subsidiary.

C. C. Morrisson, superintendent of the receiving and shipping division at Gulf Oil Corp.'s Port Arthur, Tex., refinery, has been promoted to manager of services at the company's Philadelphia refinery. He succeeds **H. W. Magee.** who has been transferred to Gulf Eastern Co., London. **Oscar T. Hotchkiss, Jr.,** assistant superintendent of the lubricating department at Port Arthur, will succeed Morrisson there.

Dr. Robert E. Conary, director of research at The Texas Co.'s Beacon, N. Y., research center, has been appointed assistant manager in the research division of the research and technical department. He will be located in research and technical department headquarters at Beacon. **Patrick J. Keating, Jr.,** assistant director of research at the Beacon research center, moves up to director succeeding Conary. **John K. McKinley,** assistant to management in the research and technical department, will succeed Keating as assistant director of research.

Personals

Carl E. Reistle, Jr., executive vice president of Humble Oil & Refining Co., and **John R. Suman,** Houston consultant and retired vice president and director of Standard Oil Co. (N. J.), will receive industry awards February 19 during the annual meeting in New York of the American Institute of Mining, Metallurgical, and Petroleum Engineers. Reistle will receive the AIME's Anthony F. Lucas Gold Medal, which recognizes outstanding contributions to petroleum engineering. Suman will receive the John Fritz Medal, which is sponsored by the AIME, American Society of

C. E. REISTLE, JR.

J. R. SUMAN

Civil Engineers, American Society of Mechanical Engineers, and American Institute of Electrical Engineers. The medal recognizes "notable scientific or industrial achievement." Reistle, former AIME president, joined Humble in 1936. He became manager of production operations in 1945, a director in 1948, vice president in 1955, and executive vice president earlier this year. Suman retired in 1955 after serving as a director and vice president of Humble and later as vice president, director, and a member of the executive committee of Jersey Standard.

Jack R. Grey, assistant superintendent at the El Segundo refinery of Standard Oil Co. of California, has been named manager of the Salt Lake City refinery of Salt Lake Refining Co., Socal subsidiary. Grey succeeds **Martin H. Pramme,** who has been transferred to San Francisco on special assignment for the parent company.

Rowland S. Stanfield, refinery representative at Tidewater Oil Co.'s Delaware City, Del., refinery, has retired. Stanfield has been with Tidewater since 1920. He had served as superintendent of the company's Drumright, Okla., refinery, and chief engineer at the old Bayonne, N. J., refinery before being appointed refinery representative in 1955.

A. L. Smith, assistant division engineer for The California Co. in Harvey, La., has been named supervising construction engineer for offshore with headquarters in New Orleans.

E. W. Bergquist, acting district superintendent for Interstate Oil Pipe Line Co. in Billings, Mont., has been promoted to district superintendent and transferred to Magnolia, Ark.

Jess Vaughn, Gulf Oil Corp. foreman in Tulsa, has retired after over 47 years with the company. Vaughn was chief engineer at the company's Valmeyer, Ill., pump station before his assignment in Tulsa.

Walter Randall, consulting geologist, has joined Plymouth Oil Co. as Rocky Mountain regional geologist. He will headquarter in Denver. Randall was with Atlantic Refining Co. before becoming a consultant earlier this year.

Kelly H. Gibson, Calgary zone production manager for British American Oil Co., Ltd., has joined Pacific Petroleums Ltd. as vice president for production. Gibson was area production manager at Stettler, Alta., for Canadian Gulf Oil Co. when it was merged with British American. He had been with Gulf in Michigan before transferring to Canada in 1949.

F. D. Aaring, chief petroleum engineer in the Calgary production department of British American Oil Co., Ltd., has been named Calgary production zone manager. He succeeds **K. H. Gibson.** Aaring was division petroleum engineer for Canadian Gulf Oil Co. before it was merged with British American.

H. S. M. Burns, president of Shell Oil Co., and chairman of the American Petroleum Institute, has received an honorary degree of Doctor of Science from St. Louis University. Burns, a native of Scotland, came to the United States in 1926 as geophysicist for Shell. He became president of the company in 1946.

William M. Holaday, coordinator of new-product planning for Socony Mobil Oil Co., Inc., will retire February 1. Holaday has been on leave of absence the past year serving as deputy assistant secretary of defense. Holaday has been special assistant on guided missiles in the Defense Department for the past several months and will continue in this position. He joined Socony-Vacuum Oil Co. in 1937 and had been coordinator of new-product planning since 1955.

Geologists Honor Howe

Gulf Coast Association of Geological Societies dedicated its seventh annual meeting to Dr. Henry V. Howe, right, professor of geology at Louisiana State University. Wallace E. Pratt, left, retired director of exploration for Standard Oil Co. (N. J.), made the dedication address at the recent New Orleans meeting. About 2,000 delegates representing 12 member societies of the Gulf Coast Association attended.

George Pratt, district exploration manager for Gulf Oil Corp. at Amarillo, Tex., has retired after 42 years with the company.

Jerry F. Bowen has joined Pan American Petroleum Corp. as engineer in Andrews, Tex. Bowen has just completed a tour of duty with the U. S. Army Signal Corps.

James B. Taylor, assistant manager of Signal Oil & Gas Co.'s gas department, has been elected a director of the company. Taylor has been with Signal since 1926. He has been assistant manager of the gas department since 1942.

Robert S. Finn, executive vice president of Lorac Service Corp. and Lorac Maritime Corp., subsidiaries of Seismograph Service Corp., has been transferred to the parent company as vice president in charge of domestic exploration division. **J. W. Hammond,** liaison between research, manufacturing, supply, and field divisions, has been appointed staff supervisor for foreign operations. **D. J. Kartman** will succeed Hammond. **C. E. McClure,** vice president of the company, has been named manager of Lorac Service Corp.'s petroleum industry applications and will also become manager of Lorac Maritime Corp., succeeding Finn.

Personals

Jim Laws, formerly staff engineer for reservoir and operations for Champlin Oil & Refining Co., Fort Worth, has been promoted to chief engineer of the company. Laws is a graduate of Texas A & I College, Kingsville, Tex. He has been with Champlin since 1952.

George R. Alewyne, Jr., formerly with Carter Oil Co., has joined Durbin Bond & Co., Inc., of Little Rock, Ark., as geologist.

Dwight McConnel has left Atlantic Refining Co. in Billings, Mont., where he was geologist, to join Richfield Oil Corp.'s Calgary office.

Dr. Russell M. Otis, formerly vice president of Lane-Wells Co., has joined Oil Shale Corp., Beverly Hills, Calif., as vice president and technical director.

Neal Harris, R. H. Fulton & Co., has been assigned as construction superintendent on section 4 of Four Corners Pipe Line Co., headquartered in Kingman, Ariz.

Francis J. Hortig has been named executive officer of the California State Lands Commission. He had served as acting executive officer since the retirement of **Col. Rufus J. Putnam** last July.

P. A. Chester, Winnipeg, and **A. W. Tarkington,** Houston, have been elected to the board of directors of Continental Oil Co. Chester is managing director of Hudson's Bay Co., Winnipeg, and Tarkington is senior vice president of Continental. Continental and Hudson's Bay have long been associated in ownership of Hudson's Bay Oil & Gas Co., which was established in 1926 for Canadian exploration and production. Chester joined Hudson's Bay Co. in London in 1923 and transferred to Canada in 1924. He became general manager in 1930 and managing director in 1952. Tarkington joined Continental at Ponca City, Okla., in 1948. Two years later he became assistant to the president with headquarters in Houston. He was elected a vice president and became central region general manager at Oklahoma City in 1951. Tarkington transferred to Fort Worth in 1953 as southwestern region general manager. He returned to the head office in Houston as senior vice president in 1956.

John W. Hendrickson has been appointed manager of the geological land and lease, and right-of-way departments of New York State Natural Gas Corp.

Robert H. Conkling, production engineer trainee with Continental Oil Co. in Linch, Wyo., has been promoted to associate engineer and transferred to Lance Creek, Wyo.

Dean E. Rowe has been named district geologist for Skelly Oil Co. in Abilene, Tex. He succeeds **William R. Kendall,** who has transferred to Albuquerque as district geologist. Rowe has been with Skelly since 1951, Kendall since 1948.

F. G. Dawson, management assistant in Interprovincial Pipe Line Co.'s Toronto executive offices, has been appointed chief dispatcher for the company and transferred to Edmonton. **A. B. Jones,** assistant chief engineer, has been named management assistant in Toronto. **R. K. Heule,** now management assistant in Toronto, has been transferred to Edmonton in the same capacity. **C. H. Bucklee** has been appointed assistant chief engineer replacing Jones.

Melvin K. Sween, general superintendent of Santa Maria Drilling Corp., Santa Maria, Calif., has joined Sunset International Oil Corp. as petroleum engineer in Beverly Hills, Calif.

Robert R. Gumaer has been promoted to senior chemical engineer in American Oil Co.'s research and development department. Gumaer was technical assistant to the vice president in charge of manufacturing for Pan-Am Southern Corp. when it was merged with Amoco. He was transferred to Amoco's research and development department, economics section, at that time.

Lee A. Keeling and **W. T. Ford,** petroleum engineers with Keplinger & Wanenmacher, Tulsa, have resigned to form Keeling & Ford, consulting firm in Tulsa. Keeling, a graduate of the University of Tulsa, was with Magnolia Petroleum Co. before joining Keplinger & Wanenmacher. Ford was with Carter Oil Co. and Deep Rock Oil Corp. He is a graduate of Oklahoma State University.

DEATHS

Charles Calvin Toomey, 65, president of Toomey Oil Co., Tulsa, died November 15 in Tulsa. Toomey was especially active in Osage County, Oklahoma, where many of his producing methods became standard procedure. Toomey started in Tulsa in 1918 with Carter Oil Co. and later served as assistant geologist with Skelly Oil Co. In 1928 he became vice president of the old Midco Oil Corp. and 2 years later he was elected president. Toomey Oil was formed in 1930 after Midco was dissolved.

J. A. (Jap) Neath, chairman of the board of Humble Oil & Refining Co., died November 16 at his home in Houston after a heart attack. Neath had been with Humble and its subsidiary, Humble Pipe Line Co., for almost 40 years. He was 61. Neath began his oil industry career with The Texas Co. He was later with Gulf Oil Corp. and was a district foreman for Southern Pipe Line Co. when it merged with Humble Pipe Line. Neath was named general superintendent of Humble Pipe Line in 1924; a director in 1925; and vice president in 1928. He was named a director of Humble Oil & Refining, the parent firm, in 1942, and 5 years later was elected a vice president. He had been board chairman since 1955. Active in industry affairs, Neath received the Texas Mid-Continent Oil and Gas Association's highest award for contributions to oil conservation and other activities in 1951.

Russell H. Gwinner, 62, vice president of the oil loan division of First National Bank & Trust Co. of Tulsa and formerly chief engineer of the old Sunray Oil Corp., died November 18 in Tulsa. Gwinner was with Sunray from 1944 to 1950. Before that time he was senior exploitation engineer with Shell Oil Co.

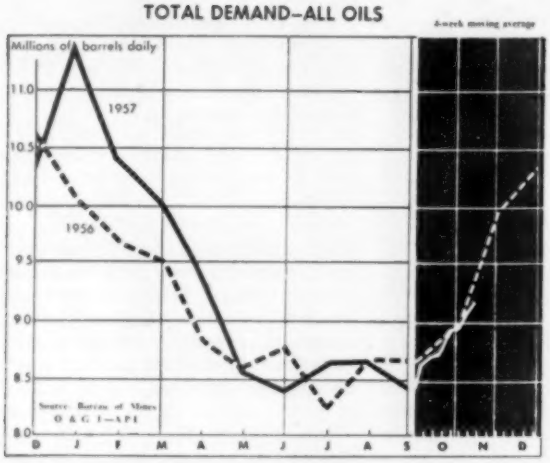
Toyoe Tanaka, chairman of the general-affairs department and a director of Koa Oil Co., Ltd., and **Hideo Kubota,** assistant superintendent of the company's Marifu, Japan, refinery, were among the 44 persons who were killed in the recent Pacific crash of a Pan American Stratocruiser. The two were returning to Japan after a business trip to the United States which included inspection of oil installations of associated companies on both the east and west coasts. Koa Oil Co. is 50 per cent owned by Caltex.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,822,850	UP	16,500	DOWN	358,590
Crude stocks	284,295,000	UP	1,184,000	UP	2,392,000
Completions	1,004	DOWN	62	UP	3
Refinery runs	7,797,000	UP	257,000	DOWN	168,000
Gasoline stocks	182,178,000	UP	1,373,000	UP	9,439,000
Kerosine stocks	33,503,000	DOWN	674,000	DOWN	2,475,000
Distillate stocks	171,511,000	DOWN	2,452,000	UP	11,051,000
Residual stocks	59,867,000	UP	529,000	UP	13,099,000
Four-product stocks	447,059,000	DOWN	1,224,000	UP	31,114,000
Total imports	1,289,200	UP	38,700	UP	42,300

TOTAL DEMAND—ALL OILS



Markets Not Anticipating General Crude-Price Cuts

PREDICTIONS of a general reduction in posted crude-oil prices last week tended to disturb already weak markets for most products at refinery centers. As the week closed, the possibility of lower crude prices in the near future was largely discounted and refinery sellers were hopeful of a more stable crude base on which to operate.

Most market observers feel that general crude-price adjustments, if any, will not be made until after January 1. By that time refiners will have had time to determine the market significance of the seasonal increases in demands and the effectiveness of the government-sponsored program of restricting imports.

There were no general changes in the refinery-price levels over the week. Distillates are showing the expected seasonal increases in demands and there are predictions that prices will be advanced fractionally in the large fuel-consuming areas.

Motor fuels were unchanged at interior points but greater price concessions were reported in the Gulf Coast in a few sales. Spot tanker sales of all the principal products were conspicuous by their absence at the gulf.

An increasing number of gasoline price wars in retail sales are reported. Some market students insist that these wars reflect unsound marketing practices rather than market weakness at the refinery level.

They blame the guaranteed margins given jobbers and dealers. The result, they contend, is that the independent wholesalers and retailers have no incentive to end the price wars. In fact they often prosper more than under normal market conditions with the refinery suppliers holding the sack.

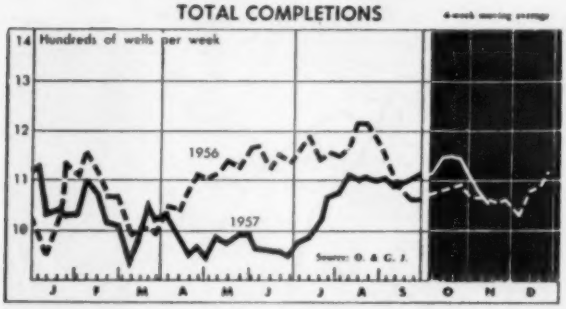
The price-war situation in Oklahoma City and Tulsa is typical of those in all parts of the country. In Tulsa the regular-grade price is 24.9 cents per gallon at major-company stations and 1 cent less at the cut-rate stations. With state and federal taxes 10½ cents, guaranteed dealer margins 5 cents, and 1.5 cents or more for jobber handling and transportation, the net at the refinery is 6.9 to 7.9 cents per gallon.

Most of the gasoline for Tulsa comes from two local refineries through direct purchase or through exchange arrangements. One Oklahoma refiner was reported to be getting less per gallon for gasoline than the delivered crude-oil cost per gallon. With other products selling for less than gasoline it is apparent that plant losses per barrel of crude oil processed are substantial at this time.

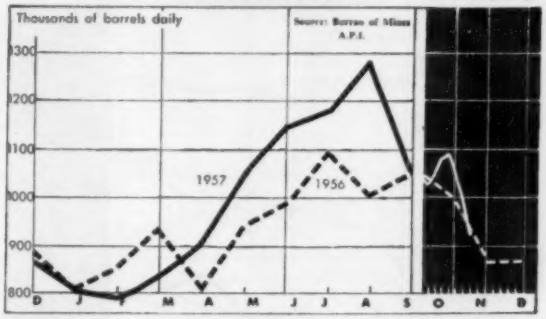
The price war in these two cities is understood to have started because of the insistence of one major company that prices of the independents at their filling stations should not be more than 1 cent under the majors. A majority of the independents are protected partially or completely with guaranteed margins with most of the gasoline coming from the refineries of companies with which they compete.

Some sales managers insist that the only answer to this price cutting is a return to the practice in which jobbers and dealers absorb all or most of the price cuts in their own operating margins. The steady construction of new stations in most consuming areas with the accompanying dilution of gallonage per station is also blamed for the unsatisfactory price conditions.

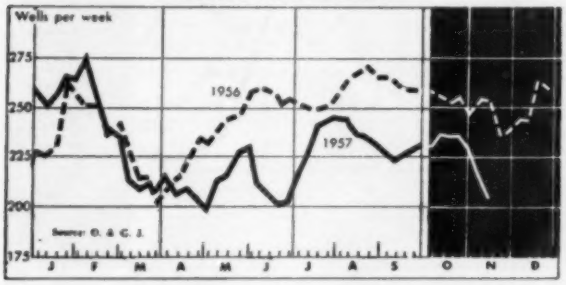
TOTAL COMPLETIONS



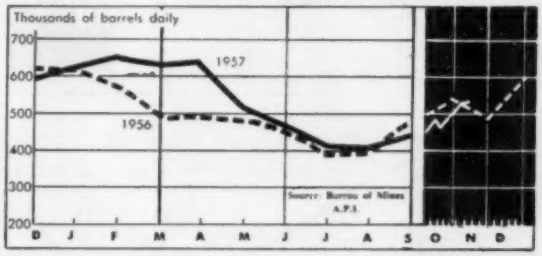
CRUDE IMPORTS



WILDCAT COMPLETIONS



PRODUCT IMPORTS

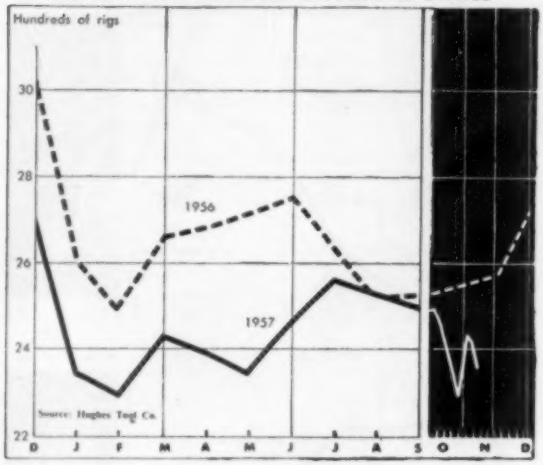


WEEKLY WELL COMPLETIONS . . . WEEK ENDED NOVEMBER 16, 1957

	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1957	1956	Total	Crude	Cond.	Gas	Dry	1957	1956
Alabama	1	0	0	0	1	0	4,010	70	‡99	1	0	0	0	1	24	‡44
Arkansas	22	12	0	3	7	0	76,223	982	849	7	0	0	1	6	182	165
California	38	18	0	2	18	0	162,145	1,940	1,958	9	0	0	0	9	460	454
Colorado	17	1	0	4	12	0	101,748	753	1,068	11	0	0	0	11	491	580
Illinois	57	23	0	2	32	0	122,656	2,371	3,463	8	1	0	0	7	553	679
Indiana	19	10	0	0	9	0	45,905	606	627	1	0	0	0	1	116	127
Kansas	85	39	0	7	36	3	314,024	3,705	4,374	6	1	0	0	5	721	956
Kentucky	46	18	0	5	23	0	70,627	1,346	1,686	12	0	0	0	12	274	384
Louisiana	83	37	4	11	31	0	559,411	3,417	3,371	8	0	0	0	8	598	682
North	43	18	0	7	18	0	145,233	1,275	1,483	5	0	0	0	5	172	233
South	25	13	4	2	6	0	266,479	1,537	1,520	1	0	0	0	1	347	383
Offshore	15	6	0	2	7	0	147,699	605	368	2	0	0	0	2	79	66
Michigan	6	1	0	0	5	0	25,108	391	387	4	0	0	0	4	139	148
Mississippi	6	1	0	0	5	0	40,393	341	389	3	1	0	0	2	172	191
Montana	8	3	0	0	5	0	47,463	378	415	6	1	0	0	5	148	161
Nebraska	15	3	0	0	12	0	83,887	791	836	8	0	0	0	8	431	415
New Mexico	51	26	2	14	9	0	215,938	1,902	1,692	4	1	0	0	3	242	243
Northwest	24	8	0	13	3	0	99,012	813	754	1	0	0	0	1	94	87
Southeast	27	18	2	1	6	0	116,926	1,089	938	3	1	0	0	2	148	156
New York	11	4	0	0	2	5	17,620	410	.....	2	0	0	0	2	9	.....
North Dakota	8	6	0	0	2	0	53,324	259	235	2	1	0	0	1	116	69
Ohio	15	8	0	2	4	1	24,699	996	952	0	0	0	0	0	16	12
Oklahoma	101	42	6	3	45	5	318,877	5,574	7,299	13	0	0	1	12	666	772
Pennsylvania	0	0	0	0	0	0	0	571	†960	0	0	0	0	0	41	†31
Texas	381	207	9	15	146	4	1,689,517	19,050	19,343	79	9	4	0	66	4,505	4,947
District 1	16	7	0	0	9	0	53,487	1,091	*2,749	6	1	0	0	5	375	*962
District 2	13	3	2	0	8	0	72,678	680	*2,322	2	0	1	0	1	234	*759
District 3	22	9	3	0	9	1	160,310	1,470	.....	4	0	1	0	3	409	.....
District 4	40	18	2	2	18	0	174,115	1,235	.....	5	1	2	0	2	389	.....
East	29	17	1	0	11	0	114,993	1,197	1,033	6	0	0	0	6	337	375
District 7-B	44	20	0	0	24	0	168,787	2,597	.....	12	1	0	0	11	876	.....
West	96	67	0	1	28	0	543,204	5,387	5,187	20	0	0	0	20	772	823
District 9	91	53	0	1	34	3	256,849	4,137	*6,885	21	6	0	0	15	1,012	*1,915
District 10	30	13	1	11	5	0	145,094	1,256	1,167	3	0	0	0	3	101	113
Utah	8	4	0	1	3	0	47,000	216	124	5	1	0	1	3	110	78
West Virginia	21	2	0	15	4	0	57,706	624	606	0	0	0	0	0	30	20
Wyoming	2	0	0	0	2	0	13,512	742	796	2	0	0	0	2	252	245
Miscellaneous (Ariz.)	3	0	0	3	0	0	3,048	123	71	3	0	0	3	0	105	64
Total U. S.	**1,004**	465	21	87	413	18	4,094,841	47,558	51,600	**194**	16	4	6	168	10,401	11,467
Total prev. week	1,066	515	21	84	419	27	4,271,252	.....	.....	210	22	7	9	172	.....	.....
Cum. 1957	47,558	24,489	524	3,450	18,124	971	196,796,060	.....	.....	10,401	1,036	98	353	8,914	.....	.....
Western Canada	50	33	0	5	10	2	231,770	2,666	2,869	13	2	0	1	10	753	.....

*Districts: 2 & 3, 1 & 4, 9 & 7-B, formerly combined. †Incl. New York. ‡Incl. Florida and Georgia.

ROTARY RIGS OPERATING IN UNITED STATES



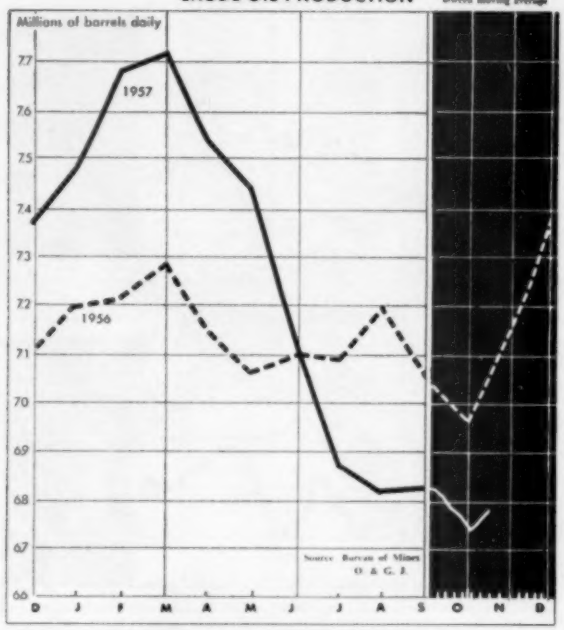
ACTIVE ROTARY RIGS*

Area—	11-18-57	11-11-57	11-4-57	11-19-56
Alabama	7	7	6	9
Arkansas	28	24	26	16
Arizona	1	1	1	...
California	89	84	82	114
Colorado	47	52	54	57
Florida	2	1	1	2
Georgia	...	...	...	...
Idaho	...	...	...	...
Illinois	47	65	60	66
Indiana	7	9	5	10
Iowa	2	2	2	1
Kansas	159	160	153	169
Kentucky	8	10	10	11
Louisiana	381	402	394	488
North	53	57	58	69
South	254	260	259	419
Offshore	74	85	77	(†)
Maryland	1	1	1	...
Michigan	9	11	13	17
Missouri	...	...	...	1
Mississippi	47	46	48	25
Montana	34	40	38	35
Nebraska	24	24	29	28
Nevada	...	...	...	2
New Mexico	155	153	138	119
New York	1	1	...	...
North Dakota	39	41	42	28
Ohio	1	1	1	...
Oklahoma	238	249	261	258
Oregon	...	...	...	...
Pennsylvania	12	12	13	6
South Dakota	3	2	2	...
Texas	877	874	909	1,028
Gulf Coast	173	179	163	249
Offshore	5	4	6	(‡)
West	354	358	369	381
North	299	287	321	332
East	46	46	50	66
Tennessee	...	...	...	...
Utah	58	54	57	28
Washington	1	1	1	1
West Virginia	4	4	3	3
Wyoming	75	80	82	60
Virginia	...	...	...	...
Total United States	2,357	2,411	2,432	2,582
Western Canada	184	166	163	244
Eastern Canada	2	2	2	...
Grand total	2,543	2,579	2,597	2,826

*Hughes Tool Co. †Included with South Louisiana. ‡Included with Texas Gulf Coast.

CRUDE-OIL PRODUCTION

4-week moving average

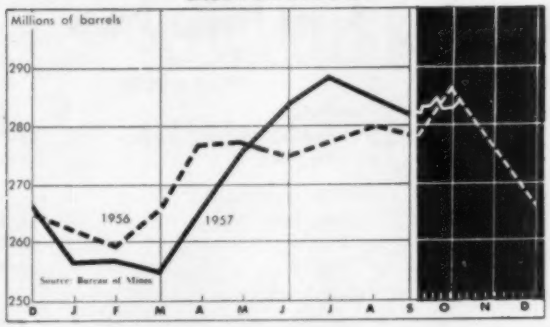


DAILY AVERAGE PRODUCTION FOR WEEK

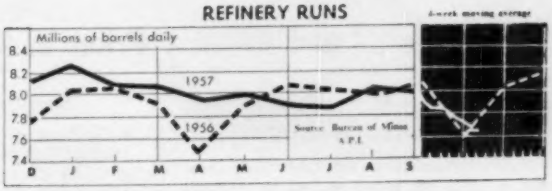
	November 16, 1957			Nov. 9
	Crude oil	Lease condensate	Total	total
Alabama	17,250	...	17,250	17,100
Arkansas	79,900	200	80,100	79,950
California	927,700	...	927,700	936,200
Colorado	144,750	...	144,750	143,700
Eastern	53,300	...	53,300	52,800
Florida	1,250	...	1,250	1,250
Illinois	226,400	...	226,400	224,600
Indiana	32,500	...	32,500	34,000
Kansas	†337,800	...	†337,800	†341,200
Kentucky	45,300	...	45,300	45,100
Louisiana	734,900	82,600	817,500	817,200
North	110,900	2,600	113,500	113,200
South	624,000	80,000	704,000	704,000
Michigan	26,500	...	26,500	27,900
Mississippi	93,700	4,400	98,100	98,100
Montana	76,650	...	76,650	77,450
Nebraska	55,250	...	55,250	56,550
Nevada	150	...	150	150
New Mexico	248,800	5,500	254,300	254,300
North Dakota	27,300	...	27,300	26,750
Oklahoma	†569,500	...	†569,500	†541,000
Texas	2,665,000	56,400	2,721,400	2,721,400
Dist. 1	50,000	525	50,525	50,525
Dist. 2	120,000	9,050	129,050	129,050
Dist. 3	380,000	27,000	407,000	407,000
Dist. 4	198,000	6,350	204,350	204,350
Dist. 5	32,000	450	32,450	32,450
Dist. 6	110,000	6,400	116,400	116,400
East Texas Field	162,000	...	162,000	162,000
Dist. 7-B	143,000	100	143,100	143,100
Dist. 7-C	150,000	3,850	153,850	153,850
Dist. 8	1,010,000	1,500	1,011,500	1,011,500
Dist. 9	207,000	600	207,600	207,600
Dist. 10	103,000	575	103,575	103,575
Utah	11,500	...	11,500	12,700
Wyoming	298,150	...	298,150	296,750
Others	‡200	...	‡200	‡200
Total U. S.	6,673,750	149,100	**6,822,850**	6,806,350
Change from prev. week, up			**16,500**	
Canada	†438,870	...	†438,870	†382,500
Total U. S. production—Jan. 1-Nov. 16				2,302,842,550 bbl.
Same period last year (crude plus cond.)				*2,288,347,955 bbl.

*Includes 39,494,180 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

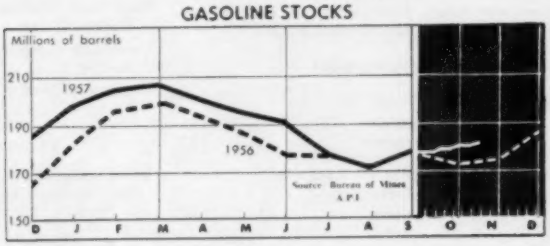
CRUDE-OIL STOCKS



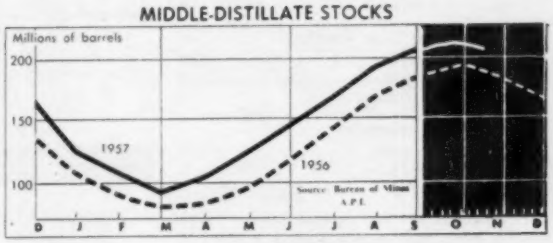
REFINERY RUNS



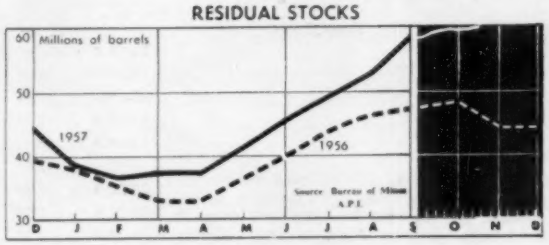
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barre s)

	11-9-57	11-2-57	11-10-56
Pennsylvania Grade	3,114	2,098	2,430
Other Appalachian	1,821	1,747	2,315
Illinois, Indiana, and Michigan	11,000	11,344	11,858
Nebraska and North Dakota	2,789	2,808	2,389
Kansas	10,626	10,379	10,283
Oklahoma	21,461	20,467	23,916
Arkansas	2,716	2,754	2,894
Louisiana	20,216	20,092	18,366
North	3,355	3,094	2,614
South	16,961	16,998	15,572
Mississippi, Ala., and Fla.	2,786	2,766	3,114
New Mexico	9,731	9,441	9,433
Texas	125,876	126,208	128,227
East Texas	10,097	9,883	8,912
West Texas	55,504	56,721	61,742
Texas Gulf	25,245	24,807	25,045
Other Texas	35,030	34,797	32,528
Wyoming	14,561	13,873	16,515
Other Rocky Mountain	7,252	7,025	6,507
California	32,199	32,010	29,332
Foreign	†18,147	19,099	14,324
Total	284,295	283,111	281,903

*Bureau of Mines. †Includes 5,767,000 bbl. in California.

A.P.I. REFINERY REPORT, NOVEMBER 15, 1957

(Thousands of barre's)

District—	Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.	Stocks‡: Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1956: Daily avg. runs	Daily average production: Gaso.*	Kero.	Dist.	Resid.
East Coast	1,131	416.1	33.4	317.3	256.4	44,678	14,093	67,155	13,684	1,141	446.6	36.0	310.5	205.0
Appalachian:														
District 1	92	41.9	3.9	19.4	8.6	4,923	606	3,566	605	105	40.9	6.3	27.0	6.3
District 2	111	55.3	9.7	21.9	14.9	2,537	479	1,467	223	101	55.5	6.1	18.7	13.0
Ind., Ill., Ky.	1,460	747.0	73.8	285.0	197.3	31,104	7,032	23,880	6,083	1,429	742.3	78.0	295.3	193.1
Minn., Wis., Dak.	98	49.6	9.4	21.4	10.0	6,351	1,602	8,325	444	100	49.9	8.1	25.5	9.0
Okla., Kans., Mo.	701	372.9	12.4	166.9	30.9	13,845	1,777	13,512	1,107	694	379.0	17.1	176.1	33.8
Inland Texas	265	209.3	8.0	45.7	22.4	6,872	549	2,619	2,106	267	186.1	8.3	54.6	19.5
Texas Gulf Coast	1,726	892.8	91.3	423.0	182.0	24,109	3,302	19,264	7,531	1,960	896.7	135.8	490.8	252.1
La. Gulf Coast	642	351.6	30.3	168.4	59.4	11,166	2,518	9,365	1,428	667	368.9	68.5	165.9	56.1
N. La. and Ark.	100	41.1	7.9	20.4	5.7	4,482	850	2,137	212	103	42.2	9.9	22.2	6.9
Rocky Mountain:														
New Mexico	27	15.0	0.0	5.6	3.4	418	11	134	70	27	13.4	0.6	5.2	3.5
Other Rocky Mt.	293	139.1	4.0	67.4	38.7	5,454	331	3,001	974	268	136.5	4.4	62.4	37.2
West Coast	1,151	504.4	5.3	162.5	344.3	26,239	353	17,086	25,400	1,170	501.3	4.5	187.3	346.8
Nov. 15, 1957	7,797	3,836.1	289.4	1,724.9	1,174.0	182,178	33,503	171,511	59,867	8,032	3,859.3	383.6	1,841.5	1,182.3
Nov. 8, 1957	7,540	3,746.3	276.3	1,695.7	1,021.6	180,805	34,177	173,963	59,338	.....	.....	.....	.....	.....
Nov. 16, 1956	7,965	3,783.3	374.1	1,737.6	1,128.1	172,739	35,978	160,460	46,768	.....	.....	.....	.....	.....

*At refineries including natural b'ended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.50-11.75
Premium (98 octane)	14.25-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.75-11.00
Regular (92 octane)	11.00-11.25
Premium (97 octane)	12.50-12.75
Premium (98 octane)	12.75-13.00
California (rack) (Los Angeles):	
Regular (88 octane)	12.2
Premium (96 octane)	14.8
Premium (98 octane)	15.0
Caribbean area (cargoes):	
Regular (87 octane)	10.625
Premium (93 octane)	11.50

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.50-10.00
Diesel oil (58 d.i. and above)	9.125-9.75
Distillate No. 1	9.125-9.75
Distillate No. 2	8.50-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.50
Distillate No. 2	8.75-9.50
New York Harbor (barges):	
Kerosine 41-43	10.75
Distillate No. 2	10.25
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.60-1.80
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.85-3.00

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	28
200 vis. neutral (180 at 100°), 25 p.t.	26

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) (§)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.15
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta.)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 36.0°-36.9°, Fao	2.00
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.59
Iraq, 36.0°-36.9°, Tripoli, Banias	2.59
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON
(Latest reported spot fixtures)

Gulf-U.S.N.H., clean (USMC—25%)	$2.14
★ Gulf-France, dirty (Scale—45%) (25s. 7d.)	7.84
★ Carib.-U.K., dirty (Scale—52.5%) (15s. 5d.)	2.16
★ P.G.-Japan, dirty (USMC—47.5%)	4.73

A welder caused us to caucus

The note from an employee suggestion box read "How come a company like this hasn't got the U. S. Savings Bond Payroll Savings Plan". It was signed by a welder in the fabricating department.

Since we actually *do* have Payroll Savings this told us two things: (1) Probably more employees than we imagined wanted the advantage of buying U. S. Bonds automatically through Payroll Savings. (2) We had grown lax in bringing our Plan to their attention.

But what to do? The solution was simplicity itself.

We called in our State Savings Bonds Director. He provided all the promotional materials needed to arouse interest in U. S. Savings Bonds. Then he helped to conduct a personal canvass and place an application blank in everyone's hands.

The results were amazing. Employee participation shot up to a percentage that we could take pride in. There was no "hard selling", nor was work interrupted. Our people wanted the security U. S. Savings Bonds offer them.

Today there are more Payroll savers than ever before in peacetime. Your State Director will be happy to help you install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write: Savings Bonds Division, U. S. Treasury Dept., Washington, D. C.

The Oil and Gas Journal
Tulsa, Oklahoma

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DRILLING ENGINEER or Tool Pusher with long, thorough experience in all techniques of drilling, testing, and well completion, wanted by oil company operating in North Africa. Furnish full information on education, experience, salary. Box K-410, The Oil and Gas Journal, Tulsa, Oklahoma.

SUB-SURFACE Exploration Geologist. Large independent oil company has opening for steady, responsible geologist with 5-7 years Gulf Coast experience. Prefer married man under 35. Send resume of background and experience, and small photo to Box K-429, The Oil and Gas Journal, Tulsa, Oklahoma.

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HELP WANTED

SAFETY ENGINEER for expanding offshore and land drilling contractor and producing company operating in the Louisiana Gulf Coast area. Experience in drilling activities and college degree desirable. Salary commensurate with ability and experience. Send photograph and complete personal history, including education, experience and salary requirements to Box K-360, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER. Opportunity in West Texas with independent oil company for experienced man under 35 with knowledge of field production problems, work-overs, testing drill stems, and completions. Replies confidential. Submit resume, including small photo and transcript of college work to Box K-430, The Oil and Gas Journal, Tulsa, Oklahoma.

CORE ANALYSIS SUPERVISOR with reservoir performance experience. Must be capable of supervising company laboratory operated by large independent in Illinois. Ability to devise non routine test procedures to evaluate various reservoir problems is required. Furnish photo, full information regarding education, experience and personal history. All inquiries will be kept in strictest confidence. Box K-421, The Oil and Gas Journal, Tulsa, Oklahoma.

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HELP WANTED

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CHIEF GEOLOGIST with sizable Independent. Age 32, legal background, experienced in production, exploration, economics, reservoir and subsurface research. Can furnish management sound exploratory program. Desire position with security—salary nominal. Box K-448, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

GEOLOGIST: B.A. Degree. Twenty years extensive experience, many areas of United States; surface, subsurface, research, exploration. Will accept foreign, preferably South or Central America. Box K-447, The Oil and Gas Journal, Tulsa, Okla.

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FOREIGN EMPLOYMENT

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OIL AND GAS MINERAL LEASES available in Dell City area of Hudspeth County, Texas. U. S. Geological Survey Map shows anticlinal axis nearby favorable for oil-gas structure. Am fee landowner of over 2000 acres. Write quickly to: Jefferson G. Smith, 215 Littlefield Building, Austin 15, Texas.

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PRODUCTION FOR SALE

450,000 BARRELS of recoverable oil by water-flooding for 10 cents per barrel. Core analysis. Terms—oil payment and cash. Box K-438, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

WANTED: Oil properties, 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

INTERESTED IN buying producing oil or gas properties, royalties or working interests. Box K-425, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED

PRIVATE PARTY desires good primary drilling acreage, with or without production at present, and with pay zone less than two thousand feet. Must be in Southern Oklahoma, North Texas, or New Mexico. Submit full details of terms, geology, lease status, etc., in first letter. Box K-442, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED INVESTMENT: Drilling Mud; Have in Fee deposit near Pampa, Texas. Has been on market tested and proven. Box 1860, Pampa, Texas.

SMALL DRILLING & Servicing Company for sale. Will take cash, terms, or stock in a sound company. Box K-445, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Pipeline Construction Corporation. Price $85,000.00 cash, or listed Securities. Oil-Gas Production Properties will be considered. Assets more than price asked. Also included is a Larger Amount Tax Loss. Box K-446, The Oil and Gas Journal, Tulsa, Oklahoma.

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PIPELINE CONSTRUCTION

(Continued from page 133)

Foreign Natural-Gas Pipelines

- **Attock Oil Co.**
  Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.
  Status: Planned.
- **City of Riyadh, Saudi Arabia**
  Project: 182 miles of 10-in. from Ghawar field to Riyadh.
  Status: Planned.
- **Cuban Gas Transmission Co.**
  Project: 650-mile pipeline from Campeche area of Mexico across Yucatan and on the ocean floor to Havana, Cuba; 150 miles would be submarine.
  Status: Being studied by Ebasco Services.
- **Gaz de France**
  Project: 550 miles of 16 to 24-in. from Lacq field, southwestern France, to Paris, plus a 10-in. terminal to Nantes and 12 to 16-in. laterals to Lyons, making a 1,000-mile system.
  Status: Under way.
  Contractor: French contractors.
  Completion: First stage in 1958; complete system in 1960.
- **NIOGAS**
  Project: 160-mile, 6, 8, 10, and 12-in. line from Fischamend field to Vienna and other Austrian cities.
  Status: Under way.
  Contractor: **Williams Brothers** and **Costain-John Brown.**
  Completion: Fall 1958.
- **Petroles Mexicanos.**
  Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.
- **Sui Gas Transmission Co.**
  Project: 217 miles of 16-in. from Sui gas field to Moultan, Pakistan.
  Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.
  Contractors: **Pakistan Constructors,** a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.,** of London.
  Project: 145-mile line from Sylhet to Dacca, East Pakistan.
  Status: Under consideration. If approved construction could start December 1958.
- **Technical Office of Hydrocarbon, Ministry of Mines and Petroleum, Government of Venzuela.**
  Project: 207 miles of 26-in. from Anaco fields to Caracas.
  Status: Under way.
  Contractor: **Williams Bhothers** has part.
  Completion: Spring 1959.
- **Union of Soviet Socialist Republic.**
  Project: 808 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow, to serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.
- **Yacimientos Petroliferos Fiscales** (Argentina)
  Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.
  Status: To start first quarter 1958.
  Contractor: **TIPSA** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.)
  Completion: Mid-1960.

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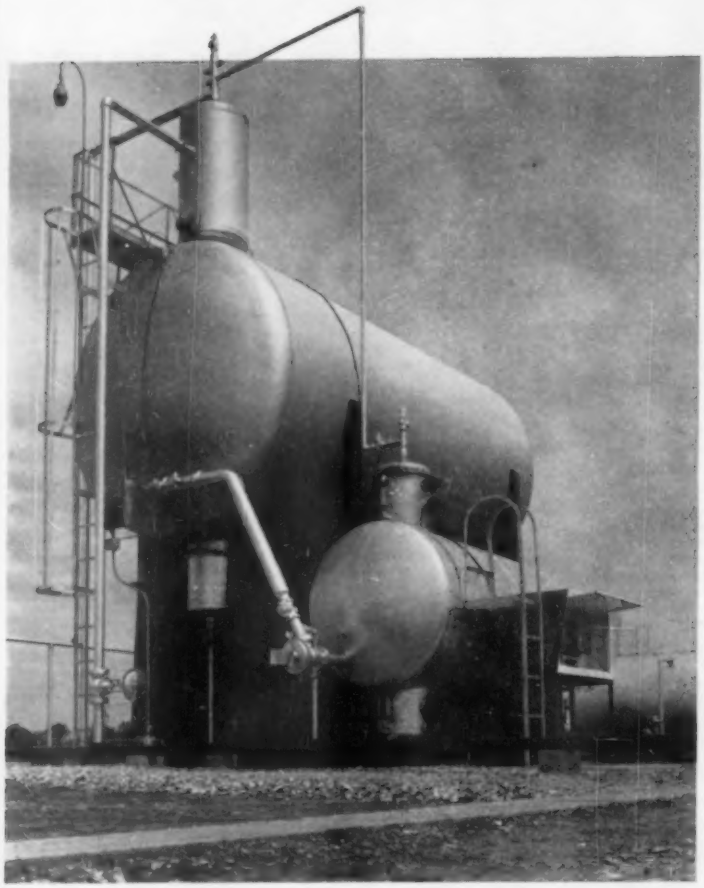
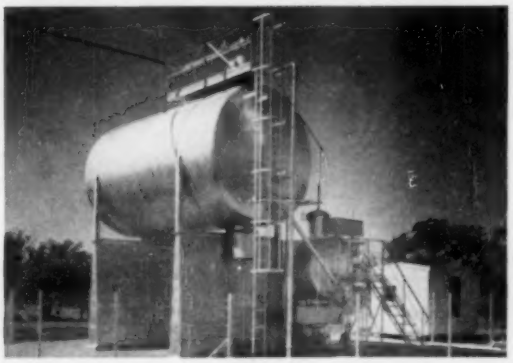


Texas Gulf Coast — 60 barrel metering tank with 400 barrel storage tank; storage tank has an oil and gas separator mounted on its inlet and is equipped with level diverting valves and hi-lo shut down controls.



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- Operates pneumatically, electrically or in combination as lease facilities dictate.
- Lease labor can be used for more productive duties.
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TULSA, OKLAHOMA

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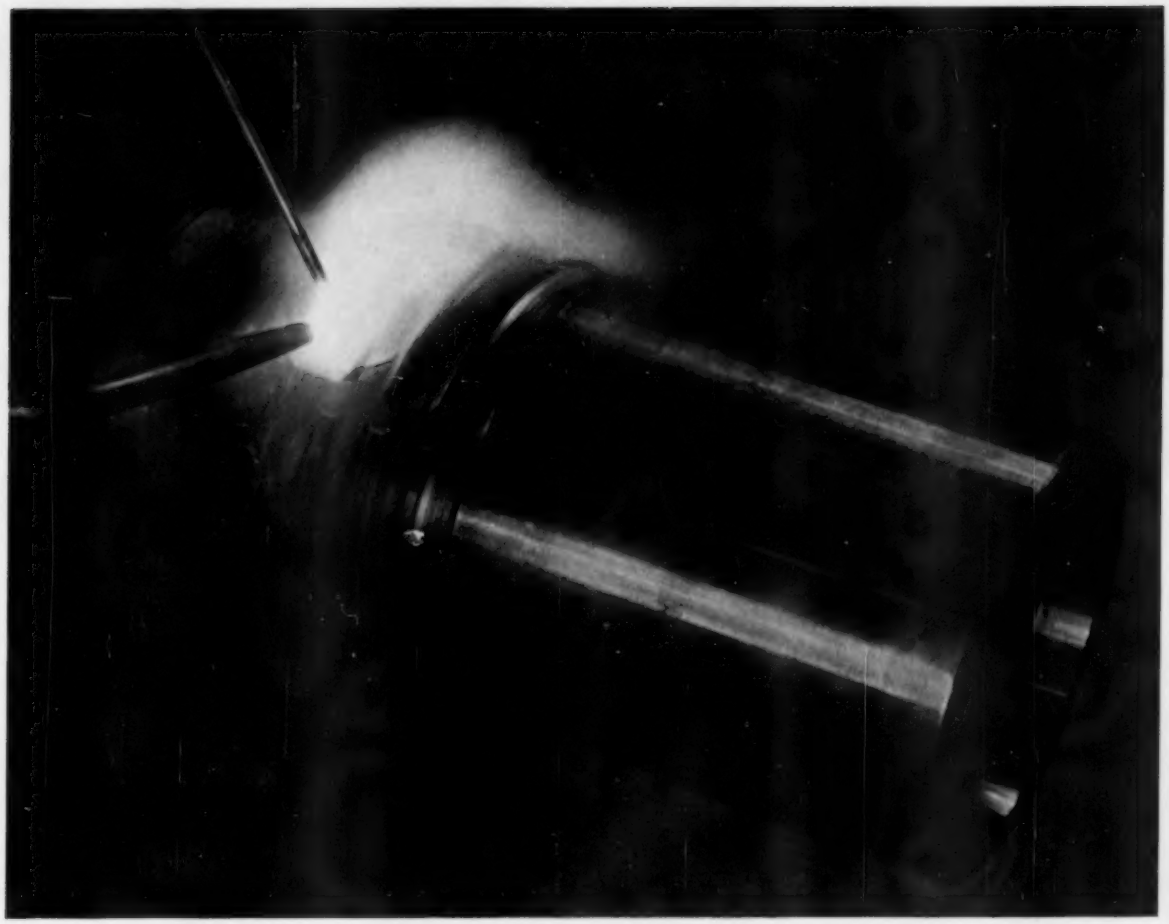

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